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ST. PAUL, MINNESOTA

March 17, 1983

Mr. Edward J. Schwartzbauer, Esquire
Dorsey and Whitney
2200 First Bank Place
Minneapolis, Minnesota 55402

Re: United States vs. Reilly Tar

Dear Mr. Schwartzbauer:

Enclosed please find the Reading and Signing Certificate of the deposition of RICHARD J. HENNESSY concerning the above-entitled matter.

Would you please have the deponent complete the Certificate according to the instructions thereon and return all copies to me for proper distribution.

If I have not received the Certificate within thirty (30) days of the date of this letter, I will file the Original of the deposition with the Clerk of Court in which this case is venued.

Thank you for your cooperation.

Sincerely,

Kirby A. Kennedy
Kirby A. Kennedy & Associates

cc: Mr. David Hird
Mr. Dennis M. Coyne
Mr. Allen Hinderaker

UNITED STATES DISTRICT COURT

DISTRICT OF MINNESOTA

FOURTH DIVISION

United States of America,
Plaintiff,
and
State of Minnesota, by its
Attorney General Warren Spannaus,
its Department of Health, and
its Pollution Control Agency,
Plaintiff-Intervenor,
vs.
Reilly Tar & Chemical Corporation;
Housing and Redevelopment authority of Saint Louis Park; Oak Park Village Associates; Rustic Oaks Condominium Incorporated; and
Philip's Investment Company,
Defendants.
and
City of Saint Louis Park,
Plaintiff-Intervenor,
vs.
Reilly Tar and Chemical Corporation,
Defendant.
and
City of Hopkins,
Plaintiff-Intervenor,
vs.
Reilly Tar & Chemical Corporation,
Defendant.

Civil No.
4-80-469

VOLUME III

The Deposition of Richard J. Hennessy, taken pursuant to Notice of Taking Deposition, taken before Kirby A. Kennedy a Notary Public in and for the County of Hennepin State of Minnesota, taken on the 7th day of March, 1982, at Indianapolis, Indiana, commencing at approximately 1:00 o'clock p.m.

APPEARANCES

DAVID HIRD, ESQUIRE, Trial Attorney, Department of Justice, 10th Street and Penn Avenue, Washington, D.C. 20530.

ROBERT E. LEININGER, ESQUIRE, Enforcement Attorney, 230 South Dearborn Street, Chicago, Illinois 60604, appeared for and on behalf of the United States Enviromental Protection Agency, Region V, Plaintiff, United States of America.

DENNIS M. COYNE, ESQUIRE, and STEPHEN SHAKMAN, ESQUIRE, Special Assistant Attorneys General, 1935 West County Road B2, Roseville, Minnesota 55113, appeared for and on behalf of Plaintiff-Intervenor, State of Minnesota.

ALLEN HINDERAKER, ESQUIRE, of the law firm of POPHAM, HAIK, SCHNOBRICH, KAUFMAN and DOTY, LIMITED, 4344 IDS Center, Minneapolis, Minnesota 55402, appeared for and on behalf of Plaintiff-Intervenor, City of Saint Louis Park.

EDWARD J. SCHWARTZBAUER, ESQUIRE, and BECKY COMSTOCK, ESQUIRE, of the law firm of DORSEY and WHITNEY, 2200 First Bank Place, Minneapolis, Minnesota 55402, appeared for and on behalf of Defendant Reilly Tar and Chemical Corporation.

ROBERT POLAK, Vice President and General Counsel, Reilly Tar and Chemical Corporation, 1510 Market Square Center, 151 North Delaware Street, Indianapolis, Indiana 46204, appeared for and on behalf of Defendant Reilly Tar and Chemical Corporation.

ALSO PRESENT:

WARREN S. THOMPSON, Director, Mississippi State University, Forest Products Utilization Laboratory, Box 552, Mississippi State, Mississippi 39762.

RICHARD J. HENNESSY

the Witness in the above-entitled matter after having been first duly sworn deposes and says as follows:

CROSS-EXAMINATION

BY MR. COYNE:

Q. Mr. Hennessy, since last we spoke and your deposition was continued, what preparation have you done for today?

A. For today?

Q. Yes.

A. I read over the deposition and made some corrections which I haven't given to anybody yet, and that's about it. All I read over was what Kennedy and Associates sent me or sent Mr. Polack.

Q. So you have not in addition to that reviewed documents?

A. No, huh-uh.

Q. The changes that you have made, can you identify some of those changes for us, apart from grammatical changes?

A. Most of them are grammatical. No big changes. No appreciable changes. I can't remember anything that I objected to. Mostly grammatical. For instance, time

after time, she used the word scrapers for vapors which I can understand, she not realizing what a vapor is.

Q. Have you conferred with anyone with regard to the testimony that you have previously given?

A. I conferred with Becky this morning or did I -- we didn't discuss testimony I gave though; but, no, really I haven't. No.

Q. I would like to focus for a few moments on the air lift pump going back to the earliest days of the plant's operation. When the air lift pump was in operation, did the water flow out or gush out of the open casing into a ponding area?

A. Well, there again, this is going back 25 or 30 years. 30 years I guess. If I remember it correctly, the water went from -- through a pipe to a stilling basin, and then from the stilling basin to the pond. That's as I remember it.

Q. I would like to show you State of Minnesota Deposition Exhibit Number 35, the uppermost photo on the page is captioned "Republic Creosoting Company, May 1930", and there is a notation made of a receiving pan and an arrow pointing to a small structure. Can you identify that structure?

A. Well, I know what a receiving pan is. What a receiving pan is is a pan which is under the condenser

which receives the oils, and evidently they have moved this receiving pan outside and are using it for a different purpose, and they still call it a receiving pan but it obviously is not being used as a receiving pan. I don't know what it is being used as here. This is May 1930?

Q. The photo carried the caption of May1930.

A. Well, that's when I was still in grade school. No, but I think that's what receiving pan means. I think somebody has used a receiving pan for some purpose other than its designed purpose. In other words, they needed a pan for something, either to receive oils from a scrubber or something, and they just had an old pan which they moved out there and they used it.

Q. Was a scrubber in operation at that time at the Saint Louis Park plant?

A. I can't tell you. That was before my time. But I know scrubbers were installed at that plant probably in the 20's; but there again that's just from reading letters over the years and so forth.

Q. Now, the structure that is referred to as the receiving pan in Exhibit 35, could that be the stilling basin or surge tank that we have referred to previously?

A. Well, I don't believe it is because of its

location. If I were putting in a stilling basin, I certainly wouldn't put it that far away from the pond.

Q. Did you ever see that structure as shown in Minnesota 35?

A. I can't remember it. I don't remember seeing it.

Q. Where do you think that the stilling basin or surge tank was located in reference to the cooling water pond?

A. In my opinion, it was located on the north shore of the pond. That's where I thought it was.

Q. Now, as we look at State of Minnesota Deposition Exhibit Number 9, the mylar map, there is a notation "diesel fuel tank" and a line with an arrow going generally to the west. Would that line intersect the approximate location of the stilling basin as far as you know?

A. Well, the line going to the stilling basin would pass very close to that diesel fuel tank I am sure because if you run a line from the Republic deep well to the north shore of the pond, why you would run pretty close to that diesel fuel tank. I imagine it ran to the west of the refinery to the stilling basin, which I believe was on the shore of the lake or shore of the -- what do you call it, the pond.

Q. Pond?

A. Yes.

Q. If I understand you correctly then, the well was not located at the same location as the stilling basin?

A. No, no, no. It wasn't.

Q. And it was located as shown on the Minnesota Exhibit 9?

A. That's correct, yes. That's my memory of it.

Q. Now, I would like to show you an aerial photograph, this has Bates Number 305244 on the lower right-hand corner, and it is the aerial photo referenced in the State of Minnesota Interrogatory Number 86. Can you identify or locate the surge tank or stilling basin on this aerial photo?

A. Well, I don't know what that is. That could be it or this could be it. I would think maybe it's right where that "26" is. I don't know. I can't see what that is; but this is where I thought it was.

Q. And by "this", because we have to make a record today, you mean in the lower part of the circle number 26?

A. Yes, right on the shore.

Q. Was the stilling basin in use from 1917 through 1972?

A. I don't know, but I am sure it was in use in the '50's; but from '17 to '50, I don't know.

Q. So that you are sure it was in use in conjunction with the operation of the air lift, is that right?

A. I believe it was.

Q. But it would not have been in use in conjunction with the water lubricated or oil lubricated pump?

A. Okay. Again let me say yes and no, and I will tell you why. When the oil lubricated pump was put in, there was a hydropneumatic tank put in, and the water flowed from the hydropneumatic tank through pipes to the condensers. And then hot water from the condensers flowed to the stilling basin and to the pond. Now, that's as I remember it. Now, after we discontinued use of the hydropneumatic tank but still used the electric pump, I believe we went through the old line to the stilling basin. Now, this was done at the plant. I didn't see that but I think that's what they did.

Q. When you say "done at the plant" --

A. Well, I mean people at the plant made this change. I didn't. But I believe that is the case.

Q. When the change was done at the plant, did

the engineering department make drawings and otherwise approve the project?

A. No, because all they had to do -- they already had the line in for the -- they already had the line in for the air lift. All they had to do was to connect the pump to that line, and they had it back again.

Q. So during the period when the hydropneumatic tank was in operation, the flow was from the wellhead to the tank and then into the condensers bypassing the cooling pond?

A. I believe that's right. The reason we put the hydropneumatic tank in was so we could have water under pressure to those condensers. Yes, that's correct.

Q. And they would also bypass the stilling basin?

A. Well, it would bypass the stilling basin on the way to the condensers; but the hot water from the condensers to the pond, I believe, went through the stilling basin.

Q. Why was that?

A. Why was that? To prevent a turbulence in the water in the pond. I believe that's right.

Q. Prior to the hydropneumatic tank, the water, as I understand, went from the well through the

settling basin into the pond, is that correct?

A. It went from the well to the stilling basin to the pond, right. That's correct.

Q. And during this period when that was the pathway, if you will, from the well to the pond through the stilling basin, did water flowing from the condensers, the cooling water from the refinery, also pass through the stilling basin and then into the pond as was the case when the hydropneumatic tank was in operation?

A. I believe it did. I believe they used what they called the fire pump and pumped it to the -- the fire pump being on the south shore, pumped the water to the condensers and then the hot water from the condensers then went to the stilling basin to the pond. I believe that's correct.

Q. So that the stilling basin received water from both the well and from the cooling water from the refinery during the period prior to --

A. During that period, yes, I think so.

Q. The line that brought water from the well into the stilling basin and then into the pond prior to the hydropneumatic tank --

A. Okay.

Q. -- did that -- and I understand then with the hydropneumatic tank there was a direct connection

between the well of the tank and the condensers. Was there some other change made --

A. Are you talking now about when we used the air lift? You said prior to the hydropneumatic tank. That was the air lift.

Q. Right. What I am trying to establish is what changes were made in the water distribution line that brought water in from the tank to the basin or changes in the water main, the water distribution system over time. I wonder if you could just give us a perspective on that.

A. I can give you my memory or the way I think it was. I think when the air lift was used, there was a line from the pump to the pond. Now, I believe that line went to the stilling basin. Then there was a line from the -- what they call the fire pump on the south side of the pond. That line went to the condensers in the building. Then there was a hot water line. The hot water from the condensers was collected, came off the top of the condensers, and I believe that line went to the stilling basin and the hot water went from the stilling basin into the pond.

Q. That would be the period when the air lift was in operation?

A. Yes, that's right.

Q. How did that change once there was the water lubricated pump that was installed in the early '50's?

A. Okay. When the water lubricated pump was put in, we put in a hydropneumatic tank, and the water was pumped out of the well into the hydropneumatic tank. It went from the hydropneumatic tank to the condensers, and hot water from the condensers then flowed, as it did before, to the stilling basin and into the pond.

Q. We know that later in the middle '60's, there was another change in the pond.

A. That is correct, yes.

Q. This time to an oil lubricated pump?

A. Yes.

Q. Were there changes in the water distribution lines associated with the conversion to the oil lubricated pump?

A. Your question has to do with lines to the condensers or --

Q. Well, you described the line from the well through the hydropneumatic tank into the condensers?

A. Right.

Q. And we know that the hydropneumatic tank was in operation only for a few years?

A. Right.

Q. From approximately 1955 to 1958?

A. Something like that.

Q. And we know that in 1966 there was a change in the pump to the oil lubricated pump?

A. There was a second pump put in?

Q. There was a second pump put in in 1966.

A. I had forgotten that but at any rate go ahead.

Q. Going back to 1958 and the problems with the hydropneumatic tank -- and the tank was taken out of service, isn't that right?

A. Yes.

Q. At that point then when the tank was taken out of service, did the water distribution scheme revert back to the same as it was with the air lift?

A. Yes, exactly.

Q. Now, going forward again to 1966 and the change to the oil lubricated pump, obviously the pump was changed to an oil lubricated pump, but apart from putting a new pump in, were other changes made at that time in the water distribution --

A. I don't know of any. I don't know why they would have made a change. I don't know.

Q. What was the construction of the stilling basin?

A. If I remember correctly, it was an old pan they got somewhere. I don't know. All it was was a

rectangular pan if I remember correctly.

Q. In appearance, would it have been similar in appearance to the box like structure shown in Minnesota 35?

A. Yes, except I don't believe it had a top on it. Well, I can't say. I think it had baffles in it but that is just a still. But, there again, maybe they just cut the end out. I can't remember. You know, that's not something that I paid particular attention to at the time.

Q. Were there changes in the design of the stilling basin over the years?

A. Not to my knowledge. I don't know.

Q. Approximately what was its height?

A. Oh boy. If I had to guess, I would say --

MS. COMSTOCK: If you know.

A. I really don't know but I can give you an idea. It's between two and three feet I would say. Of course it may have been four feet. I don't know. It was somewhere between two, three or four feet. I really don't know; but it wasn't anything like ten feet. I am just giving you an idea.

Q. Its approximate width?

A. Oh, boy. I would say three to four feet.

Q. Its depth?

A. Its depth?

Q. Right, its depth.

A. That's the same as height. You mean width? Length, I can't remember. I would say maybe 15 feet. I don't know. Maybe 10 feet. I don't know. I am just -- but this gives you a rough idea of the size of it.

Q. Was the bottom of the stilling basin at the ground level or was the tank set into the ground?

A. I believe it was at ground level. There again I can't remember. As I say, I didn't pay that much attention to it.

Q. So if you walked up to the stilling basin, the top edge of the stilling basin would be at about waist height, is that your recollection?

A. I think so, yes.

Q. Where was the inlet to the stilling basin in terms -- in relation to its depth? Was the inlet at the bottom of the stilling basin or at the top?

A. I couldn't tell you that even. I don't know.

Q. Or the outlet, do you recall where the outlet would have been?

A. I can't remember there being an outlet other than I think the whole end of the thing was open to the pond, I believe, if I remember. If I am thinking of the right thing, I think it was wide open. In other

words, it was a stilling basin. You know, if you put a pipe in the end and had velocity coming out the pipe, you would defeat the purpose of it.

Q. So that the water would gush out or run out of one end of the stilling basin?

A. It just very gently ran out one end, yes. That's as I remember it.

Q. Then would it run out over the surface of the ground into the pond?

A. Oh, no. I think it discharged right into the pond.

Q. Now, if the pond would flood, as we know it did sometimes, would it then flood out the stilling basin also?

A. Well, the level would rise into the stilling basin, sure. But I don't think the stilling basin would flood because I don't think it had an end in it. You know, it wouldn't be lifted up and damaged or anything I don't believe.

Q. Would it be possible then in a flood condition for water to enter the intake to the stilling basin?

A. Well, it couldn't get in the pipe; but I don't know if the water ever got deep enough to go over it or not. I couldn't tell you. I don't know.

Q. But if the pond would flood two to three feet in depth, then I assume that the surface of the water in in the pond area would be at approximately the height of the intake to the stilling basin?

A. I think so.

Q. Why is it then that the water could not flow into the intake pipe?

A. This pipe was discharging hot water from condensers, and the condensers were coils in pans above the receiving tank so those things were -- the bottom of the pan was probably, oh, I would say seven feet in the air, maybe eight feet in the air. So the hot water line coming off of it then came off the top, and the hot water then ran down to about the level of the bottom of the pan and ran along the refinery wall and then came down and into the stilling basin. So actually the water would have to be running uphill. It would have to climb about eight feet or so to get into the pan.

Q. So that what you are referring to now is the flow of cooling water into the stilling basin from the condensers in the refinery?

A. Right, right.

Q. There were periods though, and I think you have just described them previously, when in addition

to the flow from the refinery, there was a flow from the well itself into the stilling basin?

A. That's correct.

Q. And my question is, was the intake into the stilling basin the point at which the flow from the well came into the stilling basin as well as the point where the flow from the refinery entered the stilling basin or was there more than one inlet?

A. I don't remember. Now, actually the pipe coming from the well either had to go up or go down. It couldn't go horizontal because you would block all the doors, and you would block traffic. You would block everything. So I think -- I can't say.

I think it went overhead but I could be wrong. It could have gone into a pipe trench but I don't know. I don't think there were any pipe trenches for it to go in. I know the flow was from the well to the stilling basin. Now, how the pipe ran, I don't remember; but I think it was supported in the same manner of the hot water pipe. I think it ran right along side it. But there again, as I said, I didn't have any reason to pay that much attention to it.

I walked into the plant, and I looked at the whole thing, and now you are asking me a detailed question about a certain pipe, and it's pretty

difficult. I really don't know how it ran.

Q. Well, let's take either set of facts. That is, if the water flowed from the well through a line above ground and into the stilling basin, then your testimony is that there would not be a backflow from the stilling basin during flood periods into the well, is that right?

A. No, I don't see how there could be.

Q. And that's because of the elevation of the connection between the well and the stilling basin?

A. Yes.

Q. If, however, the connection from the well to the stilling basin was at ground level or in a pipe trench, then would it have been possible for there to be, during flood periods, a flow from the stilling basin back toward the well?

A. In that case, it would be possible if the water ever got that high I would think. Of course, if we installed it that way, I would imagine we would have had a check valve in that but I can't recall. As I say, I am vague on the details of that thing.

Q. So you think if that was the construction in a pipe trench, that there may have been a back valve to prevent this back flow to the well but you don't know?

A. It's normally the way we would install it,

yes. In fact, what we would do would be to put two check valves in a series with a tell-tail valve in between; but that's the normal procedure for something like that. But I can't remember such an installation at Saint Louis Park. In fact, those pipes in that refinery, I can remember several pipes running overhead. So I don't know though. I couldn't say that one of them was that pipe. I couldn't say it wasn't either. So I don't know.

Q. I think that you have previously testified that the top of the casing at the Republic deep well was at approximately waist height?

A. I think that's right.

Q. And it's true, as best you can recall, that the top edge of the stilling basin was also at waist height, isn't that right?

A. Something like that, yes. Two or three feet, maybe four feet. I don't remember.

Q. And the surface of the cooling water pond would ordinarily be several feet below the top of the stilling basin and the top of the Republic deep well casing, is that right?

A. Well, I would say normal pond level was maybe a foot below the ground. So I would say it would be three to four feet below the top of the well, something

like that.

Q. So then if there were flood conditions at the site and the water would rise a foot and a half, two feet in the vicinity of the pond, we would then expect some flooding of the stilling basin?

A. Well, it would flood the bottom of it, yes.

Q. What problems, if any, would be associated with flooding the stilling basin?

A. Well, as far as the stilling basin goes, I don't think it would give you too many problems. It would still work. The problem with flooding would be that your water would get very dirty, you know, in the pond; but as far as affecting the stilling basin goes, I don't see how it would affect it.

Q. Was there ever a separator used in conjunction with the stilling basin to assure better water quality entering the plant?

A. No, I can't remember any settling basin.

Q. Or oil separator?

A. No, I don't remember any at all.

Q. The mylar Minnesota Exhibit Number 9 you will notice, Mr. Hennessy, has a dashed line which leads from the settling basin to the south and the west, to the southwest corner of the site and then along the western edge of the site, do you see that?

A. Right.

Q. And that line has been sometimes referred to as the effluent sewer?

A. Right.

Q. Where did that sewer discharge to?

A. It discharged to a sewer under Walker Street, to a pipe under Walker Street.

Q. And then from that pipe, where did the flow go?

A. The flow went to an area -- I called it a swamp or a ponding area which is just to the south of Walker Street.

Q. I would like to refer again to this aerial photo that we have previously identified, and that is Number 305244 in the lower right-hand corner, and you will notice that there is an area which is referred to on the aerial photo as Area 54, and this would be the area south of Walker Street, and then to the left lower corner is an area shown as Area 55. Is this the swamp area that you have just referred to?

A. Yes, correct.

Q. So that the effluent sewer would discharge under Walker Street and into the area shown at 54 and the area shown as 55?

A. That's right, yes.

Q. Going back to the pipe that went from the well to the stilling basin, were there any connections to that pipe in that length between the well and the stilling basin?

A. Not that I know of.

Q. And that was the case throughout the years of the plant's operation, as best you can recall?

A. Well, prior to 1950, I can't say. See, at one time they had 16 stills there. They had 17 stills there, and how stills 1 through 8 -- I am sure they got their water though from that same fire pump. So I would say yes. I am guessing, but I would say yes. I don't know.

Q. Mr. Hennessy, I am showing you the Interrogatories of the State of Minnesota, and the purpose in showing you the interrogatory and the answer is to establish that you were the author of the answer. If you take a moment to look at the interrogatory, you will notice that in the interrogatory, Photograph Number 305244.

A. That's this one, yes.

Q. Then there is an identification of different reference points.

MS. COMSTOCK: Do you want to specify which interrogatory you are looking at for the record?

MR. COYNE: I think I have. It's Interrogatory Number 86.

BY MR. COYNE:

Q. And then the answer or response to Interrogatory Number 86 sets out and identifies the referenced locations on the aerial photos, and on the top of Page 72, it has your name. Are you the one who prepared the response to this interrogatory?

A. I must be. I am the only R. J. Hennessy there.

Q. You will notice that this aerial photo, Number 305244, has these referenced locations 54 and 55. The response says that 54 is the bog south of Walker Street, and that would be correct?

A. Yes, that's right.

Q. And then it has in parenthesis, "Trench network did not flow to this area." Can you explain that or clarify that?

A. It requires some explanation. The trench network flowed to a sump from where it was pumped to the settling basin. Now, actually after it went to the settling basin, it did flow to that area; but what that's saying is the trench network was not just drained to that area.

Q. Just so I can understand. The effluent sewer

line which we have previously described as shown on mylar map, State of Minnesota 9, did discharge through the culvert beneath Walker Street and into the area shown as 54 and 55?

A. That's right.

Q. The trench network, to which you make reference, are the trenches which were tributary to the settling basin?

A. I am talking about the pipe trenches around the refinery and the treating plant. I am sure that's what I was talking about.

Q. That trench network, which carried the steam lines and carried the product lines?

A. Correct, oil and tar lines, right.

Q. Those trenches did drain to the settling basin, isn't that correct?

A. Yes, that's right.

Q. So as an example, if the trenches became flooded by rain water let's say, you would have a flow of surface water runoff through the trenches, into the settling basin, through the sewer effluent line and into the bog area shown at 54?

A. Yes, that's right.

Q. And 55?

A. Yes. I can see why that needed clarification.

Q. Thank you. The pond which we show on State of Minnesota Number 9, was that pond always located in the same spot?

A. To my knowledge, it was.

Q. What maintenance was done on the air lift over the years of its operation?

A. I have absolutely no knowledge at all of what maintenance was done because I wasn't involved in that at all.

Q. Who was involved?

A. Oh, different people over the years: the plant engineer, plant maintenance supervisor, you know, there would be a lot of people over the years that maintained equipment at the plant.

Q. What repairs were made on the air lift over the years?

A. I don't know what repairs were made; but there were -- at various times through the years, you would have different maintenance supervisors, and I don't know when they started hiring plant engineers; but the plant engineer would, I am sure, do any engineering work required for maintenance or something like that. An installed piece of equipment that had been used for years, why, they know how to maintain it.

Q. Were there ever consultations with the

engineering department in Indianapolis with regard to the maintenance or repair of the air lift?

A. Not to my knowledge. Not with me there wasn't. Now, I don't know about somebody else; but to my knowledge there wasn't.

Q. Was the air line in the well ever replaced over the years when the air lift was in operation?

A. I couldn't tell you that either. I don't know.

Q. Did the air line in the well ever drop or fall into the well?

A. I never heard of it, no.

Q. What were the difficulties with the operation of the air lift?

A. I don't know. I am under the impression, and it's just an impression, that the thing wore out after a while. That's why we replaced it with a pump I believe. Plus the fact that I believe it's more economical to pump than it is to use an air lift. I think an air lift is something that's pretty old, you know. They were used back before you had real good deep well pumps.

Q. I would like to show you two Deposition Exhibits, and the first is a document written by Mr. Mootz to Mr. Horner, and the memo has a date of March

27, 1942. The second is a memo written about a week later from Mr. Horner to Mr. Mootz, and it's dated April 3, 1942. If you would read those two exhibits, which are marked as Minnesota 118, the March 27, 1942 memo, and Minnesota 119, which is the April 3, 1942 memo.

MR. COYNE: Off the record.

(At this time State of Minnesota Deposition Exhibit 118 was marked for identification by the Court Reporter.)

THE WITNESS: Okay. I read that one, is there another one?

MR. COYNE: Off the record.

(At this time State of Minnesota Deposition Exhibit 119 was marked for identification by the Court Reporter.)

BY MR. COYNE:

Q. Have you read what has now been marked as Minnesota Exhibits 118 and 119?

A. Yes, I have.

Q. Before I ask you a few questions regarding these two documents, there are a couple of additional questions I would like to ask you as a followup to the testimony you have just given. The air line for the air lift pump, was it used as a water line when the

water lubricated pump was installed?

A. I don't believe so.

Q. And what's your basis to believe it wasn't used as the water line?

A. Well, that line went from the air compressor to the air lift pump, and I don't think there would be much -- I don't think it would put the water where we wanted it. Actually, air was still used in the refinery even though the air lift pump wasn't there, and they still need the compressed air line to the refinery, so, I doubt seriously that they ever used it as a water line.

Q. The compressor that was used in conjunction with the operation of the air lift was in the vicinity of the retorts, is that correct?

A. I think it was. There was also an air compressor in the old by-products building. As I said before I didn't remember which compressor they used for the air lift pump.

Q. The by-products building is shown on Minnesota Number 9. Is that the approximate location of the building as best you can recall?

A. Yes, that's it. Right.

Q. Would you please give us an engineering description of how the air lift pump worked?

MS. COMSTOCK: If you know.

A. Well, I know how an air lift pump works. I wasn't familiar with this particular pump; but the air was piped down the well, and then there was a -- it was then routed up through a pipe where it entrained water, and of course water with air bubbles would rise pretty rapidly in the pipe because it would be much lighter than the water without air bubbles plus the energy of the air going in there. You might say it worked on kinetic energy and also a difference in density between the water with air bubbles in it and the water without air bubbles in it. I think that's a pretty simple explanation. I think that's generally the way it worked.

Q. So there was an air line which provided --

A. Provided air.

Q. Provided air to the well, and then there was a separate line which would carry the water from the well into the distribution line, is that right?

A. Yes, that's correct.

Q. As best you can, can you trace the air line from the well back to the compressor?

A. No, because there were two compressors, and don't know which one was used; but -- let's see, where is that by-products building. I want to see -- okay.

I really don't know. I can't trace it. I don't know how the line ran. Here is the by-products building right here.

Q. Pointing to the point as shown?

A. The compressor was either here or it was in this building. I don't know which. There were two compressors, one here and one there, and I don't know which one they used. So I really couldn't tell you how the air line went.

Q. The second location that you have just pointed to is the retort area?

A. Correct, it's called a treating room.

Q. Was the air line from whichever location overhead or in a trench?

A. I believe it was overhead from the -- I believe there was an overhead air line from the treating room to the refinery. I don't remember an air line from the by-products building to the refinery, and the only reason why I suspect that may have been the compressor used is he says it was a 35 horsepower motor, and I believe the motor, if it was electric, it may have been steam, I don't know, but if it was -- I believe the compressor in the retort building would have had a much larger motor on it, something like 100 horsepower but I don't know. So I really don't know, I

can't answer your question. I am just giving you what information I have got. That's all.

Q. You mentioned the 35 horsepower compressor, what document refers to a 35 horsepower compressor?

A. I just read it here just a little bit ago. You handed me a document that says there was a 35 horsepower compressor to pump water from the well which I didn't know --

MR. HINDERAKER: 118.

A. Here it is right here. The air lift is operated under 50 pounds air pressure which is supplied from the plant air compressor using a 35 horsepower motor. Now that plant air compressor doesn't tell me anything because there were two compressors. In my opinion, the one at the treating room was a larger compressor than that but I wouldn't swear to it.

Q. You just referred to the March 27, 1942 memo which is Exhibit Number 118, isn't that right?

A. Yes.

Q. Assuming that the compressor that was used in conjunction with the operation of the air lift was located in the by-products building, would the air line from the by-products building to the well most likely be in an overhead line or in a trench?

A. Well, I don't think there were -- I don't

know whether there were any trenches there or not. I really don't know because I can't tell you whether there were any trenches between those two or not. I don't know.

Q. Was the air line located alongside a product line or a steam line, would that have been the practice?

A. Yes, because you ran your pipes in raceways. You ran steam lines, air lines, tar lines, oil lines. It's like putting a railroad track through the plant, you have got to have a right-of-way for them and keep things out of there.

Q. So the trench network that you have described previously would be such a raceway, is that right?

A. The way the plant was originally built, they used trenches, and later on, from about 1930 or 1940 on, we always put the pipes overhead. So this plant being built in 1917, there were a lot of pipes in trenches, and then later on -- well, for instance, I believe these lines here were built in the '30's. See they are overhead. I believe those lines were all built in the '30's from the documents I have read.

Q. You are now referring to?

A. I am referring to --

Q. What has been marked as "overhead lines"?

A. Yes, steam, creosote and pitch.

Q. And they --

A. I know the pitch line was put in prior to 1940. I know that.

Q. And that line from the refinery to the retorts --

A. To the boiler, yes.

Q. What was the approximate size of the air line?

A. Well, again, I am guessing. I don't know but I would guess it was 2-1/2 inches or 3 inches.

Q. Would the air line size change over the years or was it constant as best you know?

A. Well, it would depend if they needed more air and put in a bigger air compressor, they had to put in a bigger line; but to my knowledge they never did that.

Q. The 2-1/2 inch or so air line that you have mentioned, that would be the approximate size of the air line as it entered the well, isn't that correct?

A. No, because -- well, I don't think they were using all that air for the well. Well, say two inches, something like that. I really don't know how big the air line was. I don't believe I ever saw that air lift. I can't remember seeing it.

Q. It would be likely to be smaller in size than the air line from the compressor?

A. It would be smaller from the transfer line,

the yard piping over to it, yes.

Q. The air line at the bottom, that is the end of the air line in the well, was it open? What was the construction of the air line?

A. Well, it had to be open to entrain the water, sure.

Q. Were there any attachments to the air line?

A. Attachments, I don't know. I don't know. As I say, I am not familiar with that air lift at all. I don't know whether they had an attachment at the bottom to entrain the water or whether the line just ended. I couldn't tell you.

Q. What was the approximate size of the line that brought water out of the well?

A. I believe -- I believe it was four inches.

Q. And what was its construction?

A. Well, the one I saw, it was welded steel. I am sure it wasn't put in that way years ago; but in the '50's it was welded steel.

Q. And what would its construction likely have been prior to that?

A. Probably screwed steel.

Q. What was the occasion for your seeing the water line?

A. Well, we built an electro pitch plant, and I

was very much involved in that, and one of the things we had to do is repair the condensers and also revamp the pans in the pan room. So I was -- I saw those water lines and drain lines, and I am sure they were welded at that time.

Q. Why was that important?

A. Why was it important?

Q. Or was it important?

A. Well, we quit putting pipe -- big pipe together. Of course, we still put inch and a half pipe together and screwed and anything two inches and over has been welded since I would say the late '30's or early '40's. That's the only reason. Actually if you are going to put a two inch line in, you can put it in cheaper welded than you could screwed so there would be no reason to put in anything screwed.

Q. You mentioned at about the time of the visit to the site that the condensers were repaired. Is that because they were leaking at that time?

A. Well, we were putting in this electro pitch plant, and we wanted -- we used eight stills, we tore out eight stills and used the other eight. While we were down, the refinery was down. We repaired -- made any repairs we needed on the condensers. As I remember, it wasn't extensive but we did repair them. You know,

we took advantage of that time to do it.

Q. And the repair was done for what reason of the condensers?

A. Just to get them in tip top shape for making electro pitch.

Q. Let's go back to the document of March 27, 1942. You were at this time in the engineering department although you had not yet become assistant chief engineer?

A. That's right. I was just a low man on the totum pole in those days.

Q. I would like to refer you to the first paragraph of the memo, the last two sentences in the first full paragraph. The first sentence reads that, "It is my thought that the pond should be used as a storage for water." Was the pond used for storage of water in '42?

A. As far as I know it was, yes.

Q. And the sentence continues that, "We should try to make only a single pumping from the well to supply the plant with water and not use the air lift which I do not believe is an economical way of pumping this water".

A. Uh-huh.

Q. What "pump" is he referring to? Was there

more than one pump used to supply the water? Was there a pump at the air lift to supply the well and was there another pump to pump from the pond to the refinery?

A. That is right, yes.

Q. What is the suggestion then that he is making here for change?

MS. COMSTOCK: I will object as calling for speculation on the part of the witness.

BY MR. COYNE:

Q. What is your understanding of what Mr. Mootz is referring to here?

A. I don't understand his objection, but evidently for some reason the plant was operating this air lift -- it must have been continually, and the way that pond was operated later, when I was involved with it, they never did that. They -- what they would do would be they would wait until the temperature of the pond got fairly high. I don't know how high, maybe 140 degrees or something, and then they would start the deep well or start the air lift or whatever it was and they would put cool water from the well into the pond until the temperature dropped, and then they would continue pumping out of the pond.

But I get the impression from reading Doctor Mootz's letter that they are using this air lift

practically all the time, and I don't know why. I don't know whether it was hooked to the condensors directly or what. He says he wants to use the pond for water, for storage of water. That's what we did later. I thought they did in '42. I don't know.

Q. I would like to refer you to the last paragraph in the memo of March 27, 1942 and the fifth line which references the failure of the plant water supply. The question is under what circumstances would the plant water supply fail?

MS. COMSTOCK: If you know.

A. The only circumstance I can think of is if somebody shut the pump off or the pump broke or something like that. I don't know.

Q. During this period, 1942, the air lift was in operation? Isn't that true?

A. I think that's correct, yes.

Q. And you don't know of any failures of the air lift, as I recall your testimony, isn't that correct?

A. I don't know of any, no. That's right.

Q. You will notice that a few lines further into that same paragraph there is reference to back pressure and to contamination. What is back pressure?

A. He is talking about if you had the city water hooked to our water, and this is something that when

you do you must do very carefully of the the water companies are very persnickety about that, and I don't blame them. The problem is if you have your own water supply and you have a city water supply, if for any reason the pressure in your line should be higher than the pressure in the city water line, you would pump water from your line into the city water main, and you would be in real trouble with the water company and the Board of Health if that ever happened.

So there are many ways of designing lines where this can't happen, but that's what he is talking about. Let's see, "In this way we would not have a back pressure on it of our own water supply which might contaminate city water." I think all he is talking about there is he wants to disconnect our water from the water heater to the boiler and connect city water to it, and then there can be no back pressure -- we wouldn't have to put in one of these installations to protect the city water.

Q. Would you just explain how that is so, if it was connected as you have just described?

A. How what is so? What Mootz is suggesting?

MS. COMSTOCK: Perhaps you can restate your question, Dennis, so it's clear.

A. Mootz is suggesting disconnecting our water

from the water heater and hooking city water in. Then he says, "We have no back pressure problem," which would be true. We wouldn't.

Q. The question is, can you describe how disconnecting the water heater would eliminate the potential for the back pressure to occur?

A. Okay. We have -- in 1942 when this letter was written obviously we have our own water supply supplying the water heater. Now, Mootz is saying let's have city water to the water heater but instead of having city water as a backup, let's just use city water period and disconnect ours from the water heater, and this way there can be no back pressure on the city water. That's what he is saying. I am sure this would have been approved by the water company.

Q. What contaminants would there be or what contamination would result if there was back pressure?

A. Well, anything that's in your water, dirt, germs, anything. I mean, if you have a well in your house, you are not allowed to have that hooked to the same line as the city water main or you would get in trouble. I mean, you have to have complete separate water cisterns, right.

Q. That's my understanding.

A. Yes.

Q. Let's go to the April 3, 1942 memo. This is State of Minnesota 119. You will note that was written about a week later than Minnesota 118. What I would like to do is refer you to the second paragraph. He refers to a two stage pumping system for plant service, and this is consistent with your testimony, isn't it, that there was a pump to bring water from the well and then a pump to bring water from the pond?

A. Yes.

Q. The overhead tank that he refers to is an alternative, as he writes about it, to the use of a pressure tank. Do you see that?

A. I see it.

Q. Now, the hydropneumatic tank to which you made reference previously, is that a pressure tank?

A. That's a pressure tank, yes.

Q. So that the term pressure tank is synonymous with hydropneumatic tank?

A. Yes, that's right, because an elevated tank would not be a pressure tank. It would be vented to the atmosphere.

Q. Now, the pressure tank or hydropneumatic tank was installed in approximately 1955?

A. Uh-huh.

Q. That was a yes?

A. Yes, that's correct.

Q. The uh-huhs get a little confusing on the record.

A. You are right. I agree with you.

Q. The next paragraph concludes that an overhead tank is by far the best system, and that the pressure tank has so much maintenance. How is that the case, that is, the maintenance associated with the operation of the pressure tank and advantages of the overhead tank?

A. The overhead tank is a structure -- you put a tank on legs and put it up in the air, and you pump your water up into it, and you have your pressure. In other words, if your tank was 80 feet in the air, you are going to have something like 40 pounds per square inch pressure on the main, maybe a little more than that, but something like that, just from the elevation of the tank. In other words, what you do is you pump your water up into the top of the tank and let it fall to the bottom and then fill the tank up, and then you draw water out of the bottom, and you have automatically got that much pressure on your tank unless you run it empty or something. Now a hydro-pneumatic tank has a mechanical gadget and you have controls, off and on switches. You compress the air at

the top of the water as you pump it to its high level, then the level falls, and when it comes to a low level, the pump comes back on and raises the level again. Mechanical gadgets over the years do wear out and require maintenance. Whereas an elevated tank is like maintaining any other tank, you have to keep it painted or something like that but there is no mechanical maintenance to it. It's maintenance free you might say.

Q. Why was it with the advantage of the overhead tank being as you just described that an overhead tank was not installed but instead the pressure tank was installed and that was done in 1955?

A. I assume it was --

MS. COMSTOCK: If you know.

A. Well, an overhead tank is much more expensive to install. The other one is a cheaper installation, hydropneumatic tank.

Q. As best you can recall, the installation of the pressure tank was done in 1955 and not prior to that time, isn't that right?

A. No, I am sure they didn't have one prior to that time.

Q. Until 1955?

A. That's right.

Q. And in the meanwhile between 1942 and 1955,

they did not install an overhead tank?

A. No, they did not.

Q. What was Mootz's position in 1942?

A. I don't know. I am a little bit surprised at this letter because I was under the impression Mr. Mobtz was at Newark, New Jersey but evidently he wasn't. He was at Newark New Jersey later because when that company closed in 1952, we sold the plant, and that's when he moved to Indianapolis and became the production manager. I believe that's right. In '42, I am a little bit surprised he is at Indianapolis but I see he was. Of course, as I say, I didn't know too much about what was going on in the upper levels in those days.

Q. Mr. Mootz was not in the engineering department then?

A. No, he was in the production department.

MR. COYNE: I suggest that we take a break at this point, and when we return I would like to ask you some questions about Minnesota Exhibit Number 18.

A. Which one is 18?

Q. A memo from Mr. Lauck to Mr. Horner and ask that you read it over the break.

A. Okay.

(At this time a brief recess was taken.)

BY MR. COYNE:

Q. Have you read the document?

A. I have read the document, yes.

Q. The notes on the last page, there are some handwritten notes you will notice in the bottom right hand corner there appear to be some initials, do you recognize those?

A. Those are F. J. Mootz's initials.

Q. And you would assume then that that's his writing then, would you?

A. I assume it is, yes.

Q. What was his position in 1954?

A. '54, I am pretty sure he was production manager. He was over all the plant managers.

Q. In Indianapolis?

A. He was in Indianapolis in '54, yes.

Q. I would like you to refer to the first page of this memorandum and the first full paragraph on the page. You will notice in the fifth line that there are some dimensions, and those dimensions refer to an open pan. Is that open pan the stilling basin to which we have been referring?

A. Yes, that is it.

Q. Do I understand correctly that this reference would be to three feet depth, four foot width and six

feet as the length?

A. I believe that is correct.

Q. You will notice that the sentence concludes that water runs off into an open pond. That would appear to be consistent with your recollection that there was one side of the stilling basin that was open?

A. I believe that's right.

Q. The open pond that's referred to would be what we have been referring to as a cooling water pond or the pond?

A. Yes, it says "pond" on your map there.

Q. The next sentence refers to the oil slick on the pond. Now, I recollect that you testified that leaks in the condenser tubes could explain the presence of oil in the pond, isn't that right?

A. That would be possible.

Q. Do you think that that explanation is the likely reason for the appearance of oil in the pond?

A. Well, it's a possible reason.

Q. Many people would say that anything is possible, and what I am attempting to do is determine whether you think that is a probable or likely explanation?

A. Well, I could give you several theories as to where the oil came from; but I really can't say. I

can't say that the oil that Joe Lauck observed in 1954 came from the condensers. It's possible that it did.

Q. What were the other alternative theories?

A. Well, we had -- the plant was flooded on occasion which would flood the pond, and this would definitely get any oil on the ground or any creosoted wood which was being worked on in the woodworking area to the east -- yes, to the east of the refinery building, would be floated, and any oil on that wood could be put into the pond or it would flow into the pond. These are possibilities. I don't know as I said before where this oil came from. I don't know. He doesn't say, and I certainly can't say for sure where it came from.

Q. Apart from the runoff of oil from the surface of the ground, what other theory could explain the presence of an oil slick on the pond other than that theory and the contamination of cooling water from the condensers?

MS. COMSTOCK: I believe he has answered the question.

MR. COYNE: Well, he is thinking about the answer.

A. I am trying to think of another source but I can't think of any. They did have some steam pumps in

there, and the steam exhaust from those pumps probably would contain small amounts of oil because you would have to use cylinder oil to lubricate the steam cylinder, and that would probably run into the pond. I don't know. But I suspect it might run into the trench. Probably would run into the trench and into the settling basins where that oil would go. So I really can't think of anything.

Q. The next sentence refers to the operation of a steam reciprocating pump used to supply the main with water from the pond. Would that pump then provide all the water to the main?

A. Yes.

Q. And the main is referred to as a screwed main. What does that mean?

A. It means that the fittings -- the ends of the pipe were threaded and the fittings were screwed on.

Q. And what was that main constructed of?

A. Well, it obviously was steel with cast iron fittings.

Q. The course or pathway of the main as described in the next sentence, it says running through the plant serving one plant washroom, the refinery, the office washroom and the boiler house. Do you see that?

A. Yes.

Q. Is that an accurate description of the course of the main?

A. I think it is, yes.

Q. And did that change in subsequent years? Do you know?

A. When he put city water in subsequently, I don't believe he used the same route; but I am not sure. City water was put in at a later date, and a larger main was put in, a welded main.

Q. To carry the water that was supplied by the city?

A. Right.

Q. The main that carried water from the cooling water pond though would remain the same. That is, it would connect to the refinery. Would there be changes in that line associated with bringing the --

A. I don't believe that line was ever replaced. I believe that it was used until the plant shut down.

Q. The next sentence refers to solid material, both lighter and heavier than water. What would such solid material be?

MS. COMSTOCK: Objection, calls for speculation on the part of the witness.

BY MR. COYNE:

Q. What was the solid material as best you can

determine?

A. Office wash basin. I think they had sand in the water. I can remember turning it on and getting sand out.

Q. And so the sand would be carried with the water through the water main?

A. Yes, correct.

Q. And the source of that sand?

A. Obviously it was the pond.

Q. The sand would not however be lighter than water, would it?

A. Oh, no, it would settle out in the bottom of the basin, wash basin.

Q. So therefore do you still believe that it would be sand -- here Mr. Lauck is referring to the fact that this material is both lighter and heavier than water.

A. What the lighter stuff would be, I don't know. It must have been wood, that's the only solid that I can think of that's lighter than water, wood shavings or something like that. I never saw any of those but he says they were there.

Q. Further down in that first paragraph there is reference to an accumulation of scale. What does that suggest to you?

MS. COMSTOCK: Objection, speculation.

BY MR. COYNE:

Q. You testified at some length with regard to the buildup of scale and the reasons for the buildup of scale on the tubes, and my question is what does the other reference to the buildup of scale mean to you or suggest to you?

A. Well, it means that the water had some hardness to it; and when you made steam out of it, it deposited scale in the tubes.

Q. I believe you also said that creosote oil would lead to a buildup of scale.

A. I think it would. I think it would lead more to foaming than buildup of scale; but it's possible I think that it could make some scale.

Q. So that the oil slick, which appeared on the surface of the pond as reported by Mr. Lauck, would suggest that oil was entrained, if you will then, and water carried through the water main. Is that a fair conclusion? If so, there would be some buildup on the tubes on the other end of the water main in the boiler area?

A. Does he say there is oil in the boiler? "The boiler is in normally shut down every three months for washing out."

MS. COMSTOCK: Again, I am going to object as calling for speculation on the part of the witness.

A. Where does he say that there is oil in the water or in the boiler? I don't see it.

BY MR. COYNE:

Q. We have many other documents as you can recall, boiler inspections by the insurance company and other reporters referring to the contamination of the water, the appearance of oil in the water and the buildup of scale. It does not say in this particular document that the scale is attributable to the presence of oil. It does, however, say that the pond which was a source of water supplied to the boilers had an oil slick on it.

A. Yes, it says that.

Q. And also in the same paragraph it refers to the buildup of scale?

A. Yes.

Q. And as I recollect, you said that oil can result in the buildup of scale, oil in the water?

A. It can cause some scale, yes.

Q. So is there any reason to believe that the buildup of scale that's referred to here is not attributable to the oil?

MS. COMSTOCK: Objection, speculation.

A. Well, I think it's hardness because he says it's a sixteenth of an inch on the tubes and an eighth of an inch on the shell, and I don't think that's the kind of scale you would get from oil to be honest about it.

BY MR. COYNE:

Q. What kind of scale would you get from oil then?

A. I think you would get little flecks of coke. I think the oil would coke right on the tube, and you would get little beads of -- I can't call them beads, but they would be little -- I think you would get little pieces of coke on your tube.

Q. And those pieces of coke would be much different in appearance than scale?

A. I think so, yes. With a scale -- I get the impression from reading this that the scale is a sixteenth inch all the way around and an eighth of an inch in the shell.

Q. Which, basing your experience, you would not attribute to the presence of creosote oil in the water?

A. I would not. If someone told me that that was the shape of the boiler, I would say you had hardness in your water.

Q. The next paragraph refers to a closed water

system. What is a closed water system?

A. Oh, all right. Closed water system is one where the water is not exposed to the elements or to floods or any outside influence. In other words, it would be contained in a pipe under pressure so that any leak would be outside -- would be from the inside of the pipe to the outside of the pipe, and the water would be in the same condition when it reached its end-use as it would be when it left the water company. That would be my idea of a closed water system.

Q. What are its advantages or disadvantage?

A. The advantages are of course with city water, to keep the germs out of it and also keep other contaminants out of it. I mean, the water is cleaned up for drinking, and it should stay that way.

Q. The discussion of a closed water system in this paragraph is made in conjunction with the description of providing water from the well.

A. From the pond, yes. That's correct. From the well to the pond. See, it's opened at the pond. It's not closed.

Q. And as an open system, it was subject then to contamination in the open pond, is that the point?

A. That's right, yes, that's the point he is making.

Q. I notice that the last paragraph on this page refers again to the 35 horsepower air compressor, and that's the same size compressor as referred to in the March 1942 memo that you have just previously been shown.

A. Uh-huh.

Q. This would suggest to you then that the air lift was provided with air from a compressor located in the by-products building, isn't that correct?

A. Well, that's my guess because I believe that was the smaller of the two compressors, and this doesn't look like a very big compressor to me, 35 horsepower.

Q. Let's go to the second page of the memo, the first full paragraph.

A. Okay.

Q. The first sentence refers to corrosion of the water line. What would be the corrosion of the water line?

A. Well, evidently the water line corroded and had leaks, and they got 32 wooden plugs, which was the standard way of repairing that cast iron main although this was not cast iron in those days. So that's what he is talking about. He is talking about corrosion that caused leaks in the water line.

Q. How would it be that the pipe would corrode? That's the question I guess because it speaks of corrosion in the context of the operation of the air lift and attributing the corrosion to the operation of the air lift, and if you could explain how it is corrosion of the line could result from the operation of the air lift.

A. When you use an air lift, you have maximum amount of dissolved oxygen in the water. Of course the water is cold so it will hold a lot of dissolved oxygen, and you put water through the line with a lot of dissolved oxygen in it, and you are going to oxidize the line. It's going to form rust and flake off, and eventually you will get a hole in the line.

Q. At this time, which was 1954, the air lift was in operation. As I recall your testimony, water went from the air line into the pond, from the pond through the water main, isn't that correct?

A. It went from the well to the pond and from the pond to the water main, correct.

Q. How is it then that the air lift could be blamed for the corrosion of the line if water entered the line only after passing through the pond?

A. Well, the water that the well put into the pond had a maximum amount of oxygen in it. It had the

maximum amount of dissolved oxygen it could take. One way to put dissolved oxygen in water if you want to is blow air through it, and that's exactly what this thing was doing. So water would then go into the pond and have a large amount of dissolved oxygen in it, and then when the other pump pumped it through the water main, why this dissolved oxygen would attack the water main and cause it to rust.

Q. The level of dissolved oxygen would not change that much then as it passed through the basin and then was brought up into the water main by operation of this pump?

A. It would change if the water got hot; but then the water in that pond never got hot enough to take the dissolved oxygen out. You have to get water up around 210 degrees to do that. This water in that pond, I don't know what the temperature of it was but I doubt that it was ever over 140. Probably much lower than that.

Q. So you would expect the water entering the main to have a high dissolved oxygen?

A. That's what Mr. Lauck's says, uh-huh. He is attributing it to dissolved oxygen in the water.

Q. The next sentence refers to the fact that there were no water meters at the time in 1954. Were

water meters subsequently installed to meter the water withdrawn from the deep well, the Republic deep well?

A. I don't know. In the '50's and early '60's, we installed a lot of water meters at a lot of our plants for accounting reasons. Of course, when we put city water in -- that doesn't answer your question. When we put city water in there, obviously there was a meter so the water company could charge us for the water we used. But whether or not there was a water meter installed by Saint Louis Park, I couldn't say. However, there was a program during that time to install water meters for accounting purposes.

Q. Even for accounting for yourself with regard to water withdrawn from the surface water or from a well?

A. Yes, because it did cost money to run the thing, and you had to -- at Saint Louis Park, we had a treating plant, and we had a refinery. Now, how much would the accounting department allocate to the refinery, you know, all they had was an electric bill and whatever, maintenance on the pump and so forth. Well, they had to allocate so much to the refinery and so much to the treating plant, and some of our plants there was -- it caused friction in the management because, you know, one group would say they were paying

for another group's water. So in order to alleviate that, in some cases we did install water meters. But I do not remember any being installed at Saint Louis Park. I won't say they weren't; but I don't remember them being installed.

Q. In conjunction with the operation of the Republic deep well?

A. Yes, correct.

Q. The sentence refers to a loss of water between the pump and the boiler house, and the boiler house would be the end of the water main, isn't that correct?

A. Uh-huh.

Q. Yes or no, it would be --

A. Yes. Yes, that's what it says.

Q. Where along the course of the water main would the loss occur?

A. Well --

MS. COMSTOCK: If you know.

A. There again I don't know what he means by loss, but there was a washroom with wash basins, showers, and there were toilets. There were 32 wooden plugs in the line. Now, where the leak occurred, I don't know. I mean, they did not have -- as I said before, they did not have water meters on all these

lines that branched off of it. There was a line going to the by-products building at one time, a line going to the office, a line going to the shower and change room, a line going to the boiler house, a line going to the treating building. Now, I don't know what he means by loss, whether he estimated how much water was being pumped and how much was being used or how he got that. I don't know.

Q. In addition to the loss of water from the line, was there also infiltration in the line given the fact that the line had so many wooden plugs that were corroded?

A. Well, the infiltration would have to be -- I believe somewhere in here we read where the pressure was 40 pounds on that line, and that means that in order for water to infiltrate the line, it would have to be greater than 40 pounds pressure. So I doubt seriously there was any infiltration. It's not like a sewer line which is operating at atmospheric pressure you might say. Water can infiltrate a sewer line but water cannot infiltrate a city water line or a plant water line that's under pressure.

Q. There were no manholes?

A. No, there were no manholes on a water line. The water is under pressure. You couldn't put such a

thing in.

Q. You will notice in the fourth paragraph the reference to an oil separator.

A. Yes. All right.

Q. And the reference to the oil separator is in a paragraph which discusses the boiler feed water heater. How is the oil separator used?

A. In every boiler plant throughout the country when they use a feed water heater, they always put an oil separator in front of the feed water heater because your steam users sometimes put oil in the exhaust steam.

Now, see, this is not condensate. We are talking now about steam. The exhaust steam goes through the oil separator which separates out any oil entrained in the steam, and then the steam goes in the water heater and heats the water, and that's what he is talking about. He says that the thing was not installed properly, and it doesn't work too well. He says it operates poorly.

Q. I am trying to establish the purpose of the oil separator and whether the oil separator function was related to the oil slick on the surface of the pond.

A. No, because there was no connection between this thing and the pond. Actually, the oil separator is in a steam line, in an exhaust steam line. What you

do is if you have a steam user such as a steam pump or a steam compressor or something like that that does not condense the water -- not a coil because that would condense the water. But you take any steam user such as an air compressor driven by steam or a steam pump, then that exhaust steam is put into what they call a low pressure exhaust line. Maybe it runs at say ten pounds pressure or five pounds pressure, something like that. This low pressure exhaust line then is piped to the feed water heater. What this does is the water which is coming in at 70 or 80 degrees is then heated up to 210 before it goes into the boiler to get rid of the dissolved oxygen in the water so it won't attack the boiler. And also to make the boiler more efficient, you put hot water in. Then you don't need to put all that heat in to heat the water up before you make steam.

Now, in this exhaust steam line going to the feed water heater you always have -- everybody has an oil separator. The reason for the oil separator, as I said before, is steam users such as pumps, compressors, even turbines, have to be lubricated, and you get oil vapors in your steam, and the idea is to keep those oil vapors out of the feed water. So you put in an oil separator and that takes it out if it's installed properly and it's a good oil separator.

Q. I would like to refer you to the third page of the memo and the recommendations that Mr. Lauck makes at the bottom of that page. He recommends, first of all, that an electric deep well pump and pressure tank be provided. Would that be what we have been referring to as the water lubricated pump and hydro-pneumatic tank?

A. Yes.

Q. The second recommendation is to install a new plant water main from the well to the boiler house with additional connections as at present. Was a new plant water main installed?

A. I don't remember that one was. I can't say. I don't remember one at all.

Q. The additional connections, which are referenced on the top of Page 4 in the water main, were those connections other than the connections that you have described to the washroom and other points, as you have described them?

A. You mean the very top sentence with "additional connections as at present"?

Q. The first line.

A. Right, those are the connections to the office washroom, treating building, wherever water was used in the plant.

Q. You will notice that at the bottom of Page 4, Mr. Lauck writes that, "If the electric well pump is provided, the pond will dry up." Why would that be the case?

A. Because -- well, why would it be the case? That's a good one. The pond normally had to have water pumped into it to keep it from drying up because its temperature was elevated. I don't know -- as I said, I have no idea what the temperature in that pond was but I am sure it was more than 100 degrees. It may have been 110 degrees because hot water from the condensers was piped to the pond and then reused. Now, however, if he quit pumping into it, the temperature of the pond would drop to atmospheric temperature, and at Minneapolis I doubt that it would dry up. The reason I say that is I believe the rainfall would equal the evaporation of a pond that was at ambient temperature.

Q. And in addition to the rain water entering the pond, you would also have the cooling water from the condensers also entering the pond?

A. No, if he put in a closed system, he wouldn't have that, I don't believe.

Q. He would recycle the cooling water?

A. Well, that's a good question. He says the pond would dry up so obviously he is not figuring on

using it. Let's see. "If an electric water pump -- " Okay. So there would be no point to having the fire pump there. I don't know what he is doing with his hot water. He doesn't say. I don't know whether he is going to put in a cooling tower or what. There are a lot of things he could do but he doesn't say. He is talking about putting in a closed system.

Q. And a closed system would be referring to the cooling water?

A. Yes, in other words, what he was going to do was go from the deep well pump -- he was going to go to the hydropneumatic tank, from the hydropneumatic tank to the main. From the main, he would go to all these various users. He didn't go a step further but if he used it in the tar stills, the water would get hot. It would get very hot, and he would have to cool it before he could reuse it. He would have to have -- well, it wouldn't be open because the cooling tower wouldn't be open.

I think what he is talking about is just the main itself. I don't know what he had in mind. Evidently he had in mind either a cooling tower or something because he said the pond would dry up, and he wanted to connect the fire pump to the city water main. I don't know what he had in mind but those are

possibilities. Maybe at the time when you read the letter it might have made some sense; but, you know, now it's so much -- water has gone over the dam. It's hard for me to tell what he was talking about.

Q. You will notice on Page 5, the second full paragraph refers to a water scrubber, and the question is who designed the scrubber and what was its purpose.

A. I don't know but it was there when I first went to the plant. They had a tank on the refinery roof. They had a 20 horsepower fan which went to another large tank on the ground and the fumes were pumped through there. I can't remember how they were scrubbed. They were probably scrubbed with water or oil. I don't know which; but the idea was to hold down air pollution.

Q. Was this likely designed by the engineering department?

A. To my knowledge the engineering department had no drawings on it, and I don't know of anybody that worked on it.

Q. Was it customary to undertake a project like this without benefit of advice from the engineering department?

A. Not while I was there. I can't think of any project of that magnitude that was done after I came

with the company in 1938.

Q. Without consultation with the engineering department?

A. Right.

Q. How much water would be consumed in the course of the operation of a water scrubber as described here?

A. Well, if the thing worked the way I remember it did, they would use makeup water. I think the vapors went into the horizontal tank, and they had baffles coming down from the top which went under the water for about a half inch or so. So that it would take about a half inch pressure, maybe a quarter inch water pressure to force the vapors through, and they would go under the baffle and go through the water or oil, whichever he was scrubbing with. I don't know which it was.

And how much water, it would be the amount that would evaporate due to the high temperature of the gases going through. See the gases would be coming through -- depending on where they were in the distillation, from 150 to maybe over 250F. This of course would heat the water up, and it would evaporate. So makeup water would have to be added. How much that would be, I don't know. Maybe -- I don't know whether

it would be 100 gallons an hour or what.

Q. There would be a volume of waste water from the operation of this water scrubber, would there be?

A. During the operation there wouldn't be any waste water. There would just be makeup water. Eventually -- and I don't know how often. I don't know whether he pumped this to a tank and settled it out and reclaimed the oil. I don't know what he did.

Q. So there would be some waste water associated with the operation of the water scrubber, the volume of that water, and the disposal of that waste water is something that you are not able to testify to today?

A. That's right, yes. I don't remember it that well at all.

Q. I would like to show you another exhibit. This one is a document dated April 28, 1955 from Mr. Holstrom to Mr. Horner, and it will be marked as Minnesota Exhibit Number 1 20

(At this time State of Minnesota Deposition Exhibit 120 was marked for identification by the Court Reporter.)

A. Okay, I read it.

BY MR. COYNE:

Q. As you will note, this document refers to the connection to city water supply in 1955 together with

the plans to install the water lubricated pump and hydropneumatic tank. It refers to a volume of water used at the plant, and that's 400 cubic feet per hour. Does that sound right to you?

MS. COMSTOCK: If you know.

A. I don't know. If anything it sounds a little bit high. I don't know whether he means -- well, he says he is using that much. That would be about 3,000 gallons an hour.

Q. Now, that volume of water you say seems a little high to you?

A. Wait a minute. 3,000 gallons an hour. I was thinking of 3,000 gallons a minute. 3,000 gallons an hour, yes, that would only be -- yes, that sounds right, okay.

Q. That volume of water would be the water which was used for what purposes at the plant? Would that be excluding the boiler or feed water then?

MS. COMSTOCK: If you know, Dick.

A. I really don't know. I don't know if he is using the air lift at this time or not.

Q. I guess the question is: Is 400 cubic feet per hour withdrawn from the well sound like a number which you would expect it to be?

A. Yes, it's in the neighborhood of being the

correct number, yes. That would be about 50 gallons a minute.

Q. As I recall your testimony, as best you can recollect there never was a meter installed in the Republic deep well that actually determined the flow from the well?

A. I do not remember any meter being installed, that's correct.

Q. Is there any reason to believe that this 400 cubic feet per hour was not correct?

A. No, it's Mr. Holstrom's figure. How he arrived at it, he doesn't say but he says he believes it to be in the neighborhood of 400 cubic feet an hour. He must have a reason for saying it but I don't know what it is.

Q. I would like to show you another exhibit, and this exhibit is United States Deposition Exhibit Number 6, and it was written a few months later in September of 1955. I am now showing you United States Exhibit 6. My question pertains to the final paragraph of the memorandum. That is the final paragraph on the first page of the memorandum.

MS. COMSTOCK: Could we have a moment to just read through that first page, please?

MR. COYNE: Sure.

BY MR. COYNE:

Q. Just referring for a moment to the third paragraph and the reference to 50 gallon per minute flow in the main. Would that convert to approximately 400 cubic feet per hour?

A. Yes, it would, pretty close.

Q. The last paragraph on the first page of this memorandum references the inspection of the water line. Was the line inspected as referenced here?

A. I don't know. I don't remember. Not by me it wasn't. I don't know whether anybody else did it or not.

Q. And your best recollection is that in any event it was not replaced?

A. I don't remember it being replaced at all.

Q. Why would it be necessary to replace the water line?

A. Well, if it was unusable because of its condition, I suppose that it would be necessary to replace it; but that's the only reason I can think of for replacing it.

Q. By "unusable" you mean?

A. If it had so many leaks in it that the pump ran all the time. When you have a water line leak, sometimes you get a big hole where the water comes up

to the surface and washes the earth out. I don't remember that happening; but that would be the only reason I can think of for replacing it.

Q. I am showing you State of Minnesota Deposition Exhibit Number 39, the memorandum of March 5, 1958; and I will ask you to read the document, and my questions will focus on the second paragraph on the first page of the memorandum.

A. Okay. I have read it.

Q. You will note that Mr. Holstrom reports that the pump bearings had seized because tar had been deposited on them. Do you have any reason to believe that it was not tar that caused the bearings to freeze?

A. No, the only reason why I doubt that it was tar is because I don't know how tar would get into the well; but that would be my only reason to doubt it.

Q. Is that you don't have an explanation for the presence of tar in the well?

A. No, I do not.

Q. Apart from that, you don't have any reason to question that Mr. Holstrum would know tar when he saw it though?

MS. COMSTOCK: Objection, speculation called for on the part of the witness.

BY MR. COYNE:

Q. You can answer the question.

A. Well, he is -- Mr. Holstrum was very competent. Let's put it that way. I don't know if he tested this or how he determined it was tar; but if he said it was tar, I would be fairly certain it was tar.

Q. I think that you have testified that you were consulted with regard to the transition from the operation of the air lift to the installation of the water lubricated pump?

A. Yes, I was.

Q. Were you consulted again then when there were these problems with the operation of the water lubricated pump?

A. I was consulted when the controls on the hydropneumatic tank gummed up with what they called tar balls, which was really what I thought was heavy oil and sand, but I don't know what it was. As I say, it was never tested. The people that told me this used the term "tar balls", and I just never thought much about it. I just thought it was just a term that they were using.

Q. And who were the people who told you so?

A. I don't know whether it was Mr. Lauck or Mr. Finolgio or who it was that I talked to. I can't remember.

Q. Who was Mr. Finolgio? What was his role in the operations of Reilly Tar?

A. He was an engineer that worked for me.

Q. And what action then was taken to remedy this problem?

A. Well, Mr. Holstrom in his letter here says he cleaned the pump -- cleaned the bearings of the pump, and then it happened again, and I think after that we just gave up on the hydropneumatic tank because of the difficulties with the control and started pumping directly to the pond.

Q. Bypassing or eliminating the hydropneumatic tank, would that solve the problem of the bearings freezing in the delivery of water from the well?

A. Well, if there was something in the well that was causing the bearings to seize, I would say no but it seemed to. The reason we bypassed it or the reason we quit using that hydropneumatic tank was because of the controls on the tank. They were very sensitive to dirty water. I mean, if you would get any sand or anything like that in them, it gummed them up or plugged them up.

Q. Apart from Mr. Lauck and possibly Mr. Fenolgio conferring with you with regard to the operation of the water lubricated pump or the operation

of the hydropneumatic tank, were there others in the company who were conferred or conferred with one another on this point?

A. Well, everybody that would be involved in it probably would confer at one time or another, which would include Doctor Mootz and probably Mr. Horner and myself, Mr. Holstrom.

Q. Did the company consult with outside consultants?

A. Well, this letter says they consulted with Mr. Renner, but I wasn't aware of that.

Q. Were you aware of any consultations other than with Mr. Renner?

A. No, I wasn't.

Q. Any consultations with Lane Minnesota Company?

A. The name is familiar. I can't remember whether we bought the pump from them or not. We may have bought their pump. I don't know.

Q. "Their bump" being the water lubricated pump?

A. The deep well pump, yes.

Q. What happened to the compressor that had been used for the operation of the air lift?

A. It was still there. It was still in use for other reasons. That wasn't the only use of that compressor.

Q. So the compressor would no longer provide air to operate the air lift but its other operations were --

A. Sure, right.

Q. What happened to the air line that had been used in conjunction with the operation of the air lift?

A. Well, probably from the air header in the refinery to the air lift. It was just shut off. Probably that little branch was removed, but there was still air used in the refinery of course for other reasons.

Q. There was an air line in the well in conjunction with the operation of the air lift, is that correct?

A. I believe there was, yes.

Q. Was that length of the air line removed then from the well?

A. Oh, it had to be to put the pump in, sure.

Q. Do you know if it was removed from the well or if it was dropped down into the well?

A. I am sure if Mr. Renner or whoever would have put the pump in would have removed it.

Q. Do you have any knowledge yourself that it was removed rather than dropped into the well?

A. Well, I never saw it removed or I never asked anybody that particular question, "Did you remove the

pipe or drop it down the well?" No.

Q. Do you know who performed the work for the change-over from the air lift to the water lubricated pump?

A. No, I don't know what contractor Mr. Holstrom used. I can't remember.

Q. Was the treating plant equipped with a condenser?

A. The treating plant?

Q. Yes.

A. No, it was not.

Q. What happened to oils entrained in the exhaust gases pulled from the retort by the steam ejector?

A. They went through a -- they had some sort of a -- I can't remember what it was. I can remember seeing it. I never climbed up there and looked at it. I don't know what they call it but it was a gadget on the end of the ejector on which the oils -- it worked very similar to the oil separator going to the feed water heater of the boiler. What it consisted of was a bunch of baffles, I believe. Now, I didn't get up and look at it. I never had anything to do with it, but I know it was there. I saw it. They had some piece of equipment there that I believe was to collect the oil.

Now, what the equipment was, I couldn't say because I was never involved in it. All I remember is seeing it there.

Q. Is there any way that back siphonage could occur through the air line or the water line so that tar could reach the well?

A. Well, in the first place, tar should never get in an air line. I don't know how it could. Tar should not get in a water line either. I really don't know how it could happen because the tar was pumped at very high pressure with steam pumps usually because it's very viscus material, and the lines are much larger than required for water lines or air lines. They would never use the same line. I don't know of any way that tar could get into an air line or a water line. I don't know of any connections or why there would be a connection between a water line and a tar line.

Q. They were laid however in some common trenches, weren't they?

A. Oh, yes. Yes, they were.

Q. Could their proximity in the trenches and the flooding of the trenches result in introduction of some tar into the air line or water line? Is that possible?

A. I think it's very improbable because in the

first place tar is very viscus, and it's hard to pump. If you had it down there in a trench, it would be cold, and -- say you had a water line with a little leak in it. In the first place -- I don't know if water lines were in the trenches or not, but say you did have one in there with a leak in it, your preasure in the water line, the water would be leaking out but the tar would be so viscus, I don't see how it could ever enter a small hole or fill the pipe. It just sounds very impractical to me that that could happen.

Q. And is your conclusion the same with regard to the air line as with the water line?

A. My conclusion with the air line would be even more so. In the first place, I don't know that the air line ever ran down in the trench. It may have but I don't think it did. I think the only thing that ran through the trenches were tar line, oil line and steam lines. I won't say air lines did not run through trenches but I don't know that they did.

Q. Who conferred in the company with regard to the connection to the city water supply?

A. I imagine it was Mr. Holstrom because all that was handled by the local people because they knew people there. They knew who to go to, and they had to live with it. So they handled it.

Q. And the water supplied by the city, was it used only for boiler feed water?

A. I can't remember. I believe the fire hydrants were hooked to city water. I wouldn't swear to that but I believe they were. I am pretty sure they were. Of course the boiler room was hooked to it and I believe the shower room, and I believe the office was hooked to it. I believe they had -- see, when I was there in the '50's, they always brought in bottled water for drinking because of the open pond; but later no, I don't know. I really don't know, but I was under the impression that the office and the shower room and so forth was connected to city water.

Q. Were there any problems or operating difficulties associated with the use of municipal water supplied by the city after the connection was made?

A. With the operation of the municipal water supply?

Q. In other words, were there problems with the water supplied by the city?

A. The water supplied to us?

Q. Yes.

A. I don't know of any, no.

Q. The memo by Mr. Holstrom, the memo of March 5, 1958, refers to attempts to service the water

lubricated pump, taking it out and cleaning it and so forth. Apart from this description by Mr. Holstrom, what other maintenance was done on the water lubricated pump?

A. I don't know of any because most of the maintenance -- most of the trouble that I was familiar with with that thing was not the pump but the tank, the hydropneumatic tank.

Q. Do you know whether or not the plant continued to experience maintenance problems with the operation of the water lubricated pump between 1958, when this memo was written, and 1966, when the conversion was made to the oil lubricated pump?

A. I don't know anything about the maintenance on the pump. All I know is it was used. How much maintenance there was on it, I couldn't say.

Q. Are you aware of any changes that were made with the water lubricated pump while it was in operation?

A. No, I don't know of any.

Q. How often did the bearings freeze up? Was that annually or daily, weekly?

A. I can't say. I don't know. They evidently froze up twice on Mr. Holstrom before he wrote this letter but that's all I can say.

Q. When the pump was pulled and servicing was done, what was the source of water supplied to the site for cooling water purposes?

A. Well, if they didn't shut down -- I don't know how long the refinery would have been down, but if they didn't shut down, they would have just had the pond, they could have circulated water until the pond got hot or started to dry up. They could have run for about a week doing that, but that's the only water I know of.

Q. I have some questions pertaining to the installation of an oil lubricated pump in 1966, and we have previously identified documents which establish that this change to an oil lubricated pump occurred in 1966. What was the reason a transition was made from the use of the water lubricated pump to the oil lubricated pump?

A. Well, I don't know. I would assume, and this is an assumption, they thought it would be less maintenance. That's the only thing I can see, the only reason for changing that I can see.

Q. What are the maintenance advantages to the operation of an oil lubricated pump as compared to a water lubricated pump?

A. Well, the water lubricated pump of course

uses the water that's being pumped to lubricate the bearings; and an oil lubricated pump uses petroleum oil just like your car, and there are various ways of doing it. You usually have quarter inch pipes running down to the bearing and you have a little site glass showing the level of the oil, and the oil runs to the bearing. The disadvantages of it are that you do get a little oil in the water being pumped, and the oil that gets out of the bearing goes up with the water.

Q. Mr. Holstrom of course described the presence of tar on the bearings.

A. Yes, he did.

Q. In conjunction with the operation of the water lubricated pump, would the presence of tar and water withdrawn from the well not cause the bearings to freeze in an oil lubricated pump for the reasons you described, that is the design of the oil lubricated pump?

A. You mean with the oil lubricated pump when it's first seizing more than the water? Yes, it would.

Q. And the reason for that is?

A. The reason is if that was a tar or a coal tar oil that was mixed with the water, coal tar oils are not like petroleum oils, they are poor lubricants., They are not good lubricants at all. In fact, water

would be a better lubricant. So by putting petroleum oil down there, you would have a better lubricant if the oils in that water were coal tar oils.

Q. Who in the company conferred with regard to this transition from the water lubricated pump to the oil lubricated pump?

A. Who conferred?

Q. Within the company.

A. I don't know. I don't even remember it to be honest about it.

Q. Who was likely in the engineering department to have been conferred do you think? Were there people assigned to Saint Louis Park or others within the engineering department who might have some knowledge of this change?

A. Well, the only people I can think of are Mr. Fenolgio. He might have had. He was about the -- he was working at the Minneapolis plant somewhere around that period of time. He probably would be the one they conferred with.

Q. And where is Mr. Fenolgio today?

A. He is deceased.

Q. Anyone other than Mr. Fenolgio that would likely have been consulted?

A. Well, I don't know. It couldn't be Mr. Lauck

because he was no longer with us at that time. It wasn't I. I know that. I don't think it was Mr. Horner because he was working on a special project at that time. So I can't say who it was. I don't believe it was Mr. Prentiss. It could have been but I doubt it seriously.

Q. Why do you doubt that?

A. Because, like I was, he was pretty well tied up with the synthetic plant here in Indianapolis at that time.

Q. The transition from the water lubricated pump to the oil lubricated pump would not be undertaken by the Saint Louis Park facility without consultation with the engineering department, would it?

A. Probably not, but I can't remember any such consultation.

MS. COMSTOCK: Can we go off the record?

(At this time a discussion was held off the record.)

BY MR. COYNE:

Q. Do you know of any reason why there was a delay between 1958 when the tar particles reported by Mr. Holstrom to cause the bearings in the water lubricated pump to freeze up in 1966, eight years later, when there was a change to the oil lubricated pump?

A. Well, the only reason I can think of is the pump must have been usable. It must have pumped all those years.

Q. Was any vendor, consultant, or anyone else outside the company consulted with regard to the change to the oil lubricated pump?

A. Not by me. I don't know if Holstrom did or anybody else did.

Q. Were any changes made in the water distribution system in conjunction with this change to the oil lubricated pump?

A. I don't think so. I think they just changed pumps.

Q. Were any changes made in the well construction in association with the change to the oil lubricated pump?

A. The only change would have been, and there again I am just going by what I know has to be done rather than knowledge, and that is I am not sure the pumps had the same bases. They might have had to changed the base to fit the pump. I wouldn't know. But that would be the only change.

Q. You wouldn't anticipate any change in the casing?

A. No, just the mounting in the pump would be

the only change.

Q. Did the bearings in this oil lubricated pump freeze up after the installation?

A. Not to my knowledge, no.

Q. Is that because the design of the pump itself would preclude such freezeups?

A. Well, as I say, petroleum oil is a better lubricant than either water or creosote, oil, or tar if that was done there, and so you would expect a longer life from that pump, yes. It's a better pump I would say.

Q. What maintenance was done on this oil lubricated pump?

A. There again, I don't know. I don't know anything about the maintenance on it.

Q. Do you know anything about repairs made to it?

A. No.

Q. Or changes made to it over the years?

A. No.

MR. COYNE: At this point let's break for lunch, and we will come back at about 1:00.

MS. COMSTOCK: Okay.

(At this time a brief recess was taken.)

BY MR. COYNE:

Q. Mr. Hennessy, when the air lift was in

operation on the Republic dope well, did the well operate as a pressure vessel and if so would you explain that?

A. I believe it did. I believe the air pressure was -- I believe that there was an air line to the bottom or 60 or 80 feet down in the well, and it lifted water in a pipe, and it would be lifted for two reasons. First of all, you would have air pressure on the well, and also you would have this water containing all these air bubbles balance lifting it up the pipe.

Q. Now, how is it then that the well, itself is a pressure vessel? What does that mean?

A. Well, it means that -- you see when you have a well, water will rise to the static level of the well, and then as you pump it out the level is depressed a few feet. All right? Now, if you put air in the well and have the top tight, why you get air pressure on the well which will force the water up a pipe or that's where your pressure in the well comes from, and you might call that a pressure vessel.

Q. You mentioned that the top was tight on the well?

A. It had to be or it wouldn't work, sure.

Q. So there was a lid, so to speak, on the top of the well?

A. Oh, yes. Yes.

Q. Would this top or this lid prevent, for example, anything from entering the well, from being poured from the surface or entering from the top of the well casing?

A. Yes, it would. The only way you could pour anything in the well, if you wanted to pour something in the well, would be to disconnect the piping and pour it down the pipe. That's the only way I know of.

Q. So, for example, even if you had flood waters rising above the top of the casing, there would be no inundation of the well?

A. No. That's correct.

Q. This morning there was testimony with regard to the corrosion of the water main, and as I recall the corrosion was attributable to the dissolved oxygen in the water. Is that right?

A. That's correct.

Q. Is it true also that you would expect corrosion in the pipe between the well and the stilling basin similar to the corrosion; in the water main from the pond into the refinery?

A. I would say yes.

Q. Do you know if the line was in fact corroded, that is the line from the well to the stilling basin?

A. I had never heard of any real problems with it. I am sure there was some corrosion; but I never heard of any leaks or anything like that.

Q. Was that line from the well to the stilling basin above the surface of the ground or beneath the surface of the ground?

A. There again, I have already said I don't know; but I think it was above the surface of the ground. If it's where I think it was it was, above the surface of the ground.

Q. You can't say for certain that it was above the ground?

A. No, I can't say for certain.

Q. Was that length of pipe ever replaced, do you know?

A. Not to my knowledge, no.

Q. So as far as you know, it was in continuous operation from 1917 until the closing of the plant then?

A. Yes. Now, whether they replaced it when they put new pumps in, I don't know. As far as I know, that's correct, yes.

Q. Now, you testified that it was unlikely and improbable to have any infiltration of the water line so long as it was under pressure, is that correct?

A. Well, that's correct, yes.

Q. If, however, the water line was not under pressure because of a leak or because the pump was down, then it would be possible under that circumstance to have infiltration?

A. Yes, it would. If you had water on the outside of the pipe and you had a hole in the pipe, the water could leak in.

Q. But are you aware of any such occurrences?

A. No, I am not.

Q. But you also have no reason to believe that such did not on occasion occurr?

A. I do not know of any time it occurred. I don't know. No one ever told me about such a happening.

Q. Although it would be possible to have --

MS. COMSTOCK: I believe he has answered the question.

A. Anything is possible. I guess it's possible, yes.

Q. You were the chief engineer until the end of 1981, is that correct?

A. 1980, yes.

Q. Until the end of 1980?

A. Uh-huh.

Q. Did you make any recommendations at the time the plant was closed in 1971, 1972, to taking steps to

secure the well?

A. No.

Q. Did you recommend removing the pump?

A. No, I didn't recommend anything as far as the well goes.

Q. Did anyone in the company confer with regard to the well at the time of the closing of the plant or in anticipation of the closing?

A. I don't know of any.

Q. Was there any recommendation to fill the well in?

A. Not to my knowledge.

Q. Was there any recommendation to fill the Republic deep well at any time over the years of the plant's operation?

A. I don't know of any.

Q. Was the well left open? Do you know?

A. Well, again, I am sure -- the last time I saw it when I was at Reilly, it was not open. When I saw it after the Reilly plant had been torn down, it was open; but I don't know who opened it.

Q. Now, when did you see it open?

A. Oh, I would guess probably 1977, 1978, somewhere around in there.

Q. And what was your occasion to go to the plant

site at that time?

A. To talk with Mr. Reiersgord, our attorney.

Q. And so at that time you toured the plant, the site, did you?

A. We both went to the plant.

Q. Just the two of you?

MS. COMSTOCK: I am going to object and instruct the witness not to answer further with respect to that visit.

A. I can just remember two of us. That's all I can remember.

MS. COMSTOCK: If I instruct you not to answer the question, don't answer the question

THE WITNESS: Okay. All right.

BY MR. COYNE:

Q. The time immediately preceding the time when you visited the site prior to 1978, when was that?

A. It was a long time before that. It had to be in the late '50's or early '60's, and I can't remember why -- oh, all right. I was there to report on the operation of the pitch plant, the electro pitch plant. I wrote reports which, you know, you have in your documents. You showed them to me. Now, when I was there after -- yes, I was there after that. I was there in the early '60's to install the gas burning

equipment in the boiler.

Q. And did you have occasion to look at the pump or the well casing in the early '60's on that visit?

A. No.

Q. What time of the year was it when you visited the plant site in 1978?

A. What time of the year? My guess is the fall. I don't know.

Q. And what did you see when you saw the well?

A. I saw a pipe coming out of the ground about two feet high, and it was wide open, and I don't know if it was a U.S. Geological Survey or somebody had rigged up something to give you the water level in the well. I can't remember what it was but it had nothing to do with us.

Q. The well casing, the top of the well casing, approximately what height above the ground surface was it did you say?

A. I would say it was at least 18 inches and no more than two feet.

Q. As I recall your earlier testimony, you said that the top of the well casing was at approximately waist height?

A. That's right.

Q. How is it that it was at that time waist

height and in 1978 only 18 inches to two feet?

A. I don't know. Probably they cut the -- I don't know who did it. All I know is what I saw, but there was no mounting plate for a pump of any kind. When I saw it, it was just an open pipe. So obviously something had been removed. The mounting plate for the deep well pump was no longer there.

Q. Was there a motor?

A. Oh, no. There was nothing except, as I say, these instruments.

Q. So the motor was missing?

A. Everything was missing. There was nothing there but an open pipe.

Q. So if you walked over to the well, you could just look down into the well?

A. Yes.

Q. And there was no kind of housing, temporary or otherwise, over the open casing?

A. No, I didn't see any. I can remember seeing the open pipe very well.

Q. And you could look directly down into the well?

A. You could look down there. I don't think you would see anything but you could look down there.

Q. Where was this water level measurement device

in relation to the casing?

A. I believe it was right on top of the open pipe. I can't even remember what it was. I asked someone what it was, someone working there, and that's what they told me it was. I don't even know who I asked.

MR. HINDERAKER: What did they tell you it was?

THE WITNESS: They were measuring the water level in the well.

BY MR. COYNE:

Q. I am confused with regard to this water level measurement device and the testimony that it was on top of the well and yet the well was open.

A. Uh-huh. That's right.

Q. That's right that it was open and that the water level measurement device was on top?

A. Yes, and the well was open.

Q. Who was working there?

A. I don't know. We didn't hire them. I don't know who was working there.

Q. Were they people who were doing some work in association with the well or were they house painters in the neighborhood?

A. Oh, no, no. They were working in association

with the well I am sure.

Q. So the well was attended when you were there? There was someone working on the well?

A. Well, we were standing there looking at it, and this gentleman came down, and we asked him what that gadget was on there, and he seemed to know what he was doing; but who he worked for, I don't know.

Q. Was there some shed there or where did this man appear from?

A. He just walked up out of an open field. I don't know what he was doing. I didn't ask him. It was none of my business. He was very agreeable to answer, you know. He was friendly, and we talked for a little bit.

Q. And what did he say about this device?

A. I thought he told me it was for measuring the depth of the water in the well, the static level. I think that's what he told me.

Q. And did you understand that that's what was taking place at that time, that is that water measurements were being taken?

A. Well, I had no reason to dispute it. I just asked him, and that's what he told me. I had no reason to doubt him. I don't know why he would tell me something that wasn't so.

Q. What else did you see other than the well casing in your conversation with this man when you were at the plant site?

A. What else did I see? I saw some new buildings up at the north end, and I saw a big lake that hadn't been there before with -- what do you call those things? Diaphram bottom I guess you would call it. They had a diaphram forming the lake, and they had a lake there with ducks floating on it. What else was there? That's about it. There was nothing built on the south end of the plant when I was there. It was all up at the north end.

Q. Were you asked to visit the site in 1978?

A. Was I asked to?

Q. Yes.

A. Well, I don't remember whether I was asked to or not. I went up to see Mr. Reiersgord, and I saw him in his office, and he and I drove to the plant. Now, whether he asked me to go or whether he just said, "Would you like to see it," or what, I don't remember. I was certainly there for no reason for Reilly Tar and Chemical other than just to talk to the attorney.

Q. Did anyone else attend your meeting other than you and Mr. Reiersgord.

MS. COMSTOCK: I am going to object and

instruct the witness not to answer that.

THE WITNESS: So I won't answer.

MS. COMSTOCK: Good.

MR. COYNE: Well, Ms. Comstock, the point is with regard to that question that we are entitled to know who else attended the meeting, and it goes to whether or not this was a privileged series of communications or not; and without getting an answer to that question, we can't determine the facts in which this meeting occurred.

MS. COMSTOCK: All right. You can relate who else was at the meeting but not any conversations.

A. I am sure Mr. Polack was there, and I think that was it. I think there was Mr. Reiersgord and someone from his office. I don't know who it was. I think it was a lady. I don't know her name though. I am not sure. There was Mr. Polack and myself. We were in Mr. Reiersgord's office -- no, I think that's it.

Q. Did you travel with Mr. Polack then from here and go to Saint Louis Park or wherever it is Mr. Reiersgord has his offices?

A. I am sure we did. We must have traveled together.

Q. As best you can recollect, you went from the

office to the plant site and you were there with Mr. Reiersgord?

A. I what now?

Q. You went from the office to the plant site with Mr. Reiersgord?

A. We went from -- Mr. Reiersgord drove me in his car from his office to the plant site, yes.

Q. And then at that point you returned to Indianapolis then?

A. Well, yes, after going back to Mr. Reiersgord's office, and then we returned to -- did we return to Indianapolis?

A. No, Rob Polack returned to Indianapolis; but I a job to do at Granite City, Illinois. So I went to Saint Louis and went to Granite City. I did not return directly to Indianapolis from Mr. Reiersgord's office.

Q. What did you do as a followup to your visit in 1978 to the site?

A. You mean a followup to Mr. Reiersgord's visit? All I did was answer questions he asked me, and I think that's it. I did no engineering work as far as that goes except just answer questions.

Q. Did you later confer with anyone with regard to your meeting with Mr. Reiersgord?

A. Well, of course I conferred with Rob Polack

although he was present during the meeting. I am sure he was. So I don't know that there was any reason to confer. I don't think I did.

Q. That is you don't think you conferred with anyone other than Rob Polack?

A. I don't believe so, no.

Q. Did you confer at some earlier point in time with Mr. Reiersgord following the closing of the site?

A. Prior to that?

Q. I am looking at the time frame 1971 to 1978 and this meeting you have just described, and the question is whether or not at some other time in that time frame you met with Mr. Reiersgord?

A. No, I did not.

Q. My recollection is that you mentioned a meeting in 1975 with Mr. Reiersgord.

A. Well, that might have been the same meeting. You know, years -- as I say, it was '75 or '78. I don't know.

Q. As best you can recollect, there was only this one incident?

A. I only remember making one trip to Minneapolis to talk to Mr. Reiersgord. I can't remeber two trips.

Q. With regard to your testimony this morning, I

believe you said that tar does not move through pipes because of its viscosity, is that correct?

A. Well, I said it takes quite a bit of energy to put tar through a pipe, yes. It's handled in pipes but it's not like pumping water.

Q. Would creosote move any differently than tar?

A. Creosote would be easier to pump than tar and more difficult to pump than water, much more difficult than water.

Q. So in comparison to tar, it would move more readily through pipes?

A. That is correct, yes.

Q. Did you ever make any recommendations or did anyone, to your best information, make any recommendations with regard to the filling of the sugar beet well?

A. No.

Q. So you know of no such incident, that is the filling of the sugar beet well?

A. No.

Q. Who would have information with regard to the filling of the sugar beet well?

A. I don't know. That well was abandoned prior to 1917 and prior to our taking over the plant, and I don't know who would have information. I don't know

when it was filled, if it was filled. I don't know when or who did it or anything.

Q. Showing you Minnesota Deposition Exhibit Number 10, and this is a memorandum from Mr. Boyle to Mr. Finch, a memorandum dated February 5, 1971 and you will note that it directs that information pertaining to securing U.S. Army waste disposal permits be sent back to you. As I recollect your previous testimony, you were the coordinator for the company in charge of the preparation of U.S. Army waste material permits at this time?

A. Well, I did that, yes.

Q. So you collected the material or information from the various plants and then submitted the applications to the United States, is that right?

A. We had the plant managers at the various plant hire an independent laboratory to make all these -- get this data that the Army wanted, and then under my direction back in Indianapolis we filled out the Army questionnaires and sent them to the Army.

Q. I refer you to Page 3 of this Minnesota Exhibit 10, Paragraph 9. Would you take a moment and read that paragraph?

A. Okay. I have read it.

Q. Are you aware of any authorization by the

Minnesota Pollution Control Agency which would authorize the discharge of waste material to waters of the state?

A. No, because I don't think we discharged any into the waters of the state. In fact, I believe I told Mr. Boyle that such an authorization at Minneapolis was unnecessary.

Q. So your view was that such an authorization was not needed for the reason you just described?

A. Right.

Q. In any event, do you know of any such authorization by the Minnesota Pollution Control Agency?

A. No, I do not.

Q. Are you aware of any document that appears or purports to be such an authorization?

A. I can't think of any, and I think I would know about it because we are -- we had authorizations. We had to report, and whenever reported I knew about the report. We reported to Indiana. We reported to Tennessee. We reported to Utah. Where else? Lima, Ohio at one time and Cleveland, Ohio at one time. All these areas did we report monthly. Never at Minneapolis, I don't believe. If we did, I don't know about it.

Q. Are you aware of any facts that would support

the statement that an authorization was given?

A. Well, Bob Boyle wrote this letter, and I don't remember whether I corrected him or whether I asked him about it or what. I don't know. He says, "Name and address of state agency presently authorizing discharge of waste materials to waters of the state." He was the secretary of the company. He should know but I don't know of any such authorization.

Q. Did anyone tell you that no authorization was needed? In particular, did any state agency so advise?

MS. COMSTOCK: Can you put that in a time frame?

BY MR. COYNE:

Q. Well --

MS. COMSTOCK: Are you talking about with respect to the application for the Army Corp permit?

MR. COYNE: Let's start there.

A. Well, I talked to so many people. I imagine that information would have come from Herb Finch, but I don't know who else it would have come from.

BY MR. COYNE:

Q. So you are not aware --

A. I did not myself have any discussion with the Minnesota Pollution Agency at all. None.

Q. Do you know of anyone having any such conversations?

A. Well, I am sure Herb Finch must have had. He was running the plant, and normally the plant manager handled this.

Q. Did he or anyone report to you that they had had such a conversation?

A. I cannot remember such a conversation. I don't know.

Q. In the case of the Saint Louis Park facility over the years of its operation, who in Reilly Tar management was responsible for regulatory compliance?

A. I think Mr. -- well, at this time I think Mr. Boyle was. He was secretary of the company. I think he was -- he handled all of that, I believe.

Q. And for what period of time would he have assumed those responsibilities, Mr. Boyle?

A. Well, let's see. I don't know how long he was secretary of the company; but he was there before I came with the company, and he retired before I did, and I would say he probably retired probably around 1977 or '78, and I think he came with the company about in the early '30's. To answer your question how long he was in charge of dealing with these regulatory agencies, I can't say. I don't know.

Q. Were you ever aware that Minnesota Statutes required a permit for a disposal system?

A. For what kind of a disposal system? Disposing where?

Q. Were you ever aware of any state requirements for permits for disposal of waste to surface water or otherwise?

A. Well, not that we required. I was not aware of any -- I was not aware of any authorization that we required that we should -- that we had to have, no.

Q. Were you aware of any requests by any state agency to secure a permit?

A. To secure a permit, no.

Q. Did anyone at Reilly Tar ever consult legal counsel as to what environmental permits would be necessary to operate the facility?

A. I don't know. See, that would have been handled in Minneapolis, I am sure, or maybe Bob Boyle would have gotten into it. I don't know, but I wasn't in on that.

Q. And the engineering department then did not consult on such matters?

A. No.

Q. Were you aware that a lawsuit had been filed by the State of Minnesota against the Saint Louis Park

facility?

A. Well, I had heard first -- yes, I was aware of that, right. This was pretty late in the game though I think. This was after we closed the plant, I believe. I am not sure.

Q. How did you learn of the lawsuit?

A. Well, when something like that happens, you know, people talk, and everybody knows about it. Who actually told me, I don't know. But I am sure I knew about it and I heard about it, not in the official course of my business but I heard about it.

Q. Are you aware of any settlement by the company with the State of Minnesota?

A. No, I didn't know that it had been settled. I thought it was still going. I don't know of any settlement.

Q. I have some names, Mr. Hennessy, and if you could identify these people for me and what role they played in the Reilly Tar business: Les Boyer?

A. Less Boyer was head of production for all the creosoting plants.

Q. And --

A. He was here in Indianapolis.

Q. Is he still alive?

A. As far as I know he is. He is retired. He

lives somewhere in South Carolina or North Carolina, some such place.

Q. So he would have had some responsibility with his position for the operations at Saint Louis Park then?

A. The wood treating operations -- he had the same job, you might say, Lesher has for the tar plants, Les Boyer had for the treating plants. He was the man in management who was responsible for the treating plants.

Q. Thomas Courtney?

A. Thomas Courtney was a chemist who worked at the laboratory. He is older than I am, and he was there when I got there. I don't know when he started to work for Reilly. He also retired before I did; but I can't tell you when.

Q. What were Mr. Courtney's responsibilities?

A. Well, he had various responsibilities at various times. At one time he operated the pilot plant. Another time he was an analytical chemist. I don't know what other jobs he had over his career. Most of the dealings I had with him, he was running or operating the pilot plant in Indianapolis.

Q. Gerald Cravey?

A. Gerald Cravey was a man that was hired to

assist I think Les Boyer and George Reilly. I think after Les Boyer retired, George Reilly took over that job, and Cravey was a graduate engineer who had worked for Illinois State University or somewhere like that, and then the company hired him, and he was an assistant to Mr. Boyer and later I believe to Mr. George Reilly.

Q. Do you know if Mr. Cravey had any dealings with the Saint Louis Park facility?

A. I can't remember that.

Q. William Furlow?

A. William Furlow was a chemical engineer, I believe. I believe he worked at our Cleveland plant and later on he worked at our -- I believe first he worked in Indianapolis. Then in Cleveland, and then I believe he worked in Saint Louis Park.

Q. His position in Saint Louis Park?

A. Well, I don't know. I think he was plant engineer; but I can't tell you what period of time that was.

Q. By "plant engineer", you mean in a position --

A. At Saint Louis Park.

Q. And the same position that Mr. Finch had, for example?

A. No, Mr. Finch was plant manager. He was never plant engineer. Mr. Finch was running the plant.

There were only three plant managers during my years at Reilly. There was Mr. Larkin, Mr. Holstrom and Mr. Finch. They were the three plant managers. They ran the plant.

Q. The plant engineer would have responsibility for the refinery or for the retorts or what part of the operation?

A. I believe for the whole plant. Plant engineer would be called on anywhere in the plant by the plant manager. The plant manager was running the whole plant too. Now, he had superintendents under him that ran the refinery and ran the treating plant but he was the boss.

Q. The plant engineer would report to the plant manager rather than to --

A. Yes, I think that's right.

Q. Rather than reporting to the engineering department in Indianapolis?

A. Right, correct.

Q. Do you know his whereabouts?

A. Furlow's?

Q. Yes.

A. No, I don't.

Q. Is he still surviving? Do you know?

A. As far as I know he is. He is younger than I

am and ought to be.

Q. Charles Fisher?

A. Charles Fischer was plant manager of the Indianapolis plant from about 1955 until -- that plant closed in -- I don't know when it closed, about 1975 or so, somewhere around there.

Q. Would he have occasion to consult on the Saint Louis Park facility?

A. No, he was strictly responsible for the Indianapolis treating facility and also the chemical plants that were over there, chemical divisions.

Q. Paul White?

A. Paul White was a plant engineer at Saint Louis Park. I believe he also worked for a while at our Ironton, Utah plant.

Q. Did he work at Maywood?

A. I believe he did. I believe he worked at Maywood for a short time under Charlie Fisher. I believe he did.

Q. So Paul White for a time had the same position which William Furlow had for a time?

A. I believe so, yes.

Q. Do you know the whereabouts of Paul White?

A. No.

Q. He is still surviving as far as you know?

A. As far as I know he is.

Q. Ted Gruenhagen?

A. Ted Gruenhagen worked for me in the engineering department. He was connected with the engineering department.

Q. And what was his role in the engineering department?

A. He was a chemical engineer. He did design work.

Q. Design of what kind of facilities?

A. Oh, he designed heat exchangers, pressure vessels, fractionating towers, all kinds of things.

Q. Did he consult with regard to the Saint Louis Park facility?

A. Yes, he made at least one trip up there that I can think of, maybe two.

Q. The purpose of his trip?

A. He took an electrostatic precipitator and measured air pollution in the vicinity of the electro pitch plant.

Q. Was that the occasion of both his visits to the site?

A. I believe it was, yes.

Q. Did he confer with regard to the operation of the settling basin?

A. No, I doubt if he even knew we had one.

Q. Referring again to Paul White, what would be his approximate age at this time?

A. Paul White, if I had to guess, I would say probably in his early 50's. Maybe younger than that. He is younger than I am by quite a bit. Let's see. I would say early 50's may be.

Q. John Hoff?

A. John who?

Q. Hoff, H-o-f-f.

A. Is it John Hoff or Mark Hoff?

Q. I don't know. The last name is Hoff. I thought the first name was John but I may be mistaken.

A. We have a young engineer who has been with us about ten years by the name of Mark Hoff but I don't think he ever had anything to do with Minneapolis. By the time he came, Minneapolis had shut down.

Q. And you know of no John Hoff, is that right?

A. I don't know a John Hoff, no.

Q. George Jackson?

A. George Jackson? He was plant manager of our Lone Star Texas plant, and he retired before I did. He retired about 1978 or '79.

Q. Would he have had occasion to confer with regard to the Saint Louis Park facility?

A. No, not at all.
Q. Ross Johnson?
A. Ron Johnson?
Q. Yes.
A. Ron Johnson was plant manager of the Ironton, Utah plant.
Q. Would he have occasion to confer with regard to the operation of the Saint Louis Park facility?
A. Not to my knowledge, no.
Q. John Lenox?
A. John Lenox is the plant manager of our Cleveland, Ohio plant.
Q. Is he still in that position today?
A. Yes.
Q. And how long has he been plant manager at Cleveland?
A. Since Shulte retired, which was in -- I would say pretty close to 30 years, maybe 25 years.
Q. Would he have had occasion to consult with regard to the operation of the --
A. I wouldn't think so.
Q. Malcolm Mitchell?
A. Malcolm Mitchell was our process engineer in Indianapolis.
Q. By "process engineer", what do you mean?

A. Well. Many the chemists would come up with chemical processes, and then someone has to take it out of the test tube stage and put it in an engineering stage where you can design a plant. That was one of his jobs. In fact, I think it was his most important job. He designed chemical processes and put them in engineering terms or on an engineering scale.

Q. Did he have occasion to confer with regard to the Saint Louis Park facility?

A. Yes, he did.

Q. What was his consultation?

A. Well, I am sure any process he worked on, he would confer with the plant manager about the process.

Q. What specifically did he confer about with regard to the Saint Louis Park operation?

MS. COMSTOCK: If you know.

A. Well, I am sure he was involved in the by-products operation. What other operations he was involved in, I don't know; but I am sure he was involved with others. I am sure he was very much involved with the refinery operation, no question about that.

Q. How is that?

A. Pardon?

Q. How is it that he would be for certain

involved in the refinery operation?

A. Well, any special product they wanted to make or any process, anything out of the ordinary someone wanted that they wanted to produce, he would be involved.

Q. Is he alive today?

A. Oh, yes.

Q. Where can he be found?

A. Well, I believe he is in a nursing home here in Indianapolis somewhere. His health isn't too good. He has got cancer I believe.

Q. Clarence Prentiss?

A. Let's see. He has a title. Director of engineering I think is his title. He is still with us, yes. He came with us about 1959.

Q. And his position as director of engineering includes what responsibilities?

A. Well, as I understand it, things have been sort of reorganized. Now, I believe, I am not sure, but I believe the plant manager is now -- I don't know how it works. Plant engineers still report to the plant manager; but they also report to Clarence Prentiss, and also we are in more than one business. See, we are in the coal tar business. We have four coal tar plants, and we have a synthetic plant. The

synthetic plant here in Indianapolis is run entirely different than the coal tar plant, and it takes a lot more engineering to run it, and there are a lot of engineers involved in the operation of the plant as well as a few involved in maintenance, and these guys all report to Clarence Prentiss.

Q. Has he been director of engineering since approximately 1959?

A. Oh, no, since I don't know when, about 19 -- I would say about 1975-76, somewhere around in there.

Q. Has he had occasion to confer with regard to the operation of the Saint Louis Park plant?

A. Yes, he did. Yes, because when he was a young engineer -- not with that title he wasn't, but when he was a young engineer, he had a project at Saint Louis Park. He replaced the shell stills with fire tube stills.

Q. Other than that one consulting effort, were there other occasions, do you know?

A. Not to my knowledge.

Q. John Schuller?

A. John Schuller was the manager of our Norfolk, Virginia plant. He was plant manager.

Q. Over approximately what time period?

A. Well, let's see. We went out of the

creosoting business about the middle of the '70's so I would say he was -- he worked for us for 20 or 25 years as plant manager. That's just a guess but something like that.

Q. For approximately 19 --

A. 1945 to '50 or something like that, maybe '55.

Q. Did he have occasion to consult with regard to the operation of Saint Louis Park?

A. No.

Q. Walter Varnell?

A. Walter Varnell was the plant manager of the Chattanooga, Tennessee plant.

Q. Over approximately what time period?

A. I would guess from 1950 until that plant closed, which was in about '72 or '73, something like that.

Q. Is he still with the company?

A. Oh, no, he has got another job. I don't know who he is with.

Q. His approximate age?

A. He isn't too much younger than I am. I would say he is probably 60 at least, maybe early 60's.

Q. Did he have occasion to consult with regard to the Saint Louis Park facility?

A. Not to my knowledge, no.

Q. An investigation of the Republic deep well began last summer and has found coal tar or tar products at a depth of 590 feet to about 640 feet, and again at a depth of approximately 680 feet. The volume of these products or substances is approximately 800 gallons. Are you aware of any facts which may account for the presence of these materials in the well?

A. No, I can't believe that -- it's hard for me to believe. But if you say so that they found it down there -- but I don't understand how it could have happened. That's an awful lot of stuff, 800 gallons.

Q. Would you expect that oil used in lubricating the pumps would account for 800 gallons of product in the well?

A. I can't imagine 800 gallons. I would say those pumps maybe pump about a pint a day. Let's say a pint a day. It would take say a gallon a week -- no, that would take 800 weeks, wouldn't it? No, that just sounds like an awful lot to me. I just don't know, and all that oil -- see, when you use this lubricating oil, you don't pump it in the pump end, you pump it in the steam end. This lubricating oil, it lubricates the steam cylinder. It doesn't lubricate the oil cylinder. The creosote oil and the tar in the water does that, whatever you are pumping.

So it would have to go out with the exhaust steam and somehow or other be condensed and somehow or other get down the well, and I just don't see how it could. I am thinking out loud but it doesn't make sense to me.

Q. Would you expect that lubrication of the compressor used in conjunction with the operation of the air lift could be the explanation for this volume of material found in the well?

A. Now, the compressor is lubricated, the air end is lubricated; but, of course, the thing went since -- well, I don't know. How long did they use that thing? They used it from about 1917 to about 1955. They used it for about 40 years. 800 gallons sounds like an awful lot but maybe it's possible. I just can't believe that quantity though. That's a lot of oil, 800 gallons.

Q. Are you aware of any person who may have information on the presence of these materials in the well?

A. No, you are the only one I ever -- I didn't know they were down there.

Q. And if I understand you correctly, you are not aware of any possible explanation for the presence of these materials in the well?

A. No, because I don't think flood waters could have caused it. I don't think leaks in our condenser coils could have caused it. I really don't know how it could have gotten down there.

Q. Were you unaware until today of the presence of this coal tar or tar products in the well?

A. I was aware of something called tar balls in the well. I refused to believe they were tar balls. I thought I knew where they came from. I was not aware that someone actually found 800 gallons of oil and took it up and examined it and found out it was coal tar oil. I think that's what you are telling me, and that's what you are asking about. Is that right?

Q. That's right.

A. No, I didn't know about that.

Q. Were you aware that the well was investigated last summer?

A. No, I have had no connection with that well in the last few years.

Q. Is there any reason for you to believe that that material found in the well is not a product of the operation of the facility at Saint Louis Park?

A. If you are correct when you say it was a coal tar oil, I would suspect that it came from operating the plant because where else could it come from? I

mean, the quantity is so great. For instance, now we creosoted a lot of railroad ties, and they were put down all over the state, and we sold -- well, that one document you showed me one time had 50 -- Mr. Hird showed me, had 50,000 gallons of road tar that were going to be sold one summer plus they were going to get some more road tar in. This was spread all over the ground, you know. But the only difference I could see between that and us is we did it in one place. We were right there, you know, from 1917 to 1972.

I am trying to think of where the oil could have come from. So I doubt that it came from -- I doubt it came from ties or road tar. I don't know where it could have come from. I don't know how it could have leaked into the well. But if a chemist says that -- if a chemist examined it and he said it was coal tar oil and he was a competent chemist, I would believe him. It was coal tar oil. We had more of it around there than anybody; but I just can't tell you how it got down there. I don't know. In fact, I am surprised really. I didn't know about this.

Q. Are you aware of any facts which would explain the fact that this material was found at a depth of 590 to approximately 640 and then found again at a depth of approximately 680 feet?

A. This doesn't make any sense to me because if it were coal tar oil, it should sink right to the bottom of the well. I can't imagine it floating or anything like that unless there was some sort of a screen or something that would filter it out, and I can't believe that. I main, if the thing got in the well and ran down the casing some way, I can't imagine anything that would prevent water from going up to keep the oil from going down. I don't know. You say it was at three different levels?

Q. It was found in one length of the pipe from approximately 590 feet to approximately 640 feet and then found again further down at about 680 feet.

A. So that would be 50 feet and about 30 feet more. It would be a total of 80 feet. You have three layers. That doesn't make sense to me. I can't explain that, no.

Q. What I am saying is you really have like a -- not a continuous but you have the presence of the material from 590 feet to 640 feet, in that 50 foot stretch of the casing.

A. You have 50 feet of oil, all right.

Q. Then you have it again at 680 feet, the material.

MR. HIRD: But your don't have the

material in between there.

THE WITNESS: What seperates it, water?

MR. SHAKMAN: Sand.

MS. COMSTOCK: What is the question?

MR. COYNE: If Mr. Hennessy is aware of any explanation how this material could separate out as described.

A. No, I have no explanation, I can't even guess at that. That surprises me. In fact, if one of my young engineers came and told me that, I would say it's impossible.

Q. Thank you, Mr. Hennessy.

A. You are welcome.

MR. COYNE: Off the record.

CROSS-EXAMINATION

BY MR. HINDERAKER:

Q. Let me ask a few more questions.

A. Okay, Al.

Q. Let me start off with some of the discussion this morning on the well. During the time that there was the air lift, did you have occasion to visually observe it at Saint Louis Park?

A. No, I did not.

Q. So on your first visit to the Saint Louis

Park facilities in the '50's, as your recollection is, the water lubricated pump would have been installed?

A. I don't know. I won't say that but I cannot remember looking at the pump and saying this is an air lift. I just don't remember. I wasn't involved in it, and I didn't look at it. There are a lot of things at a plant, and when you go in, why, it just didn't register.

Q. So as we are here today, you don't have a recollection of the appearance of the air lift?

A. No, no. I do not.

Q. Was your testimony of this morning an explanation of how it would have worked just from general engineering background?

A. That's correct, yes.

Q. Recognizing that, I got a sense from this morning of how such a thing operates. I would like to get a sense of what it might have looked like, recognizing that you are telling us general knowledge rather than what you saw at Saint Louis Park.

A. That's correct, yes.

Q. But if we start off with the well and just accept that the well was a hole in the ground and we come up to ground level, what would you expect it to appear like?

A. I would expect to see two pipes connected to a solid top on the well, one pipe being an air pipe and the other pipe being a water line, and the air pipe would provide the pressure and the water would take the liquid away from -- the water away from the well.

Q. What would you expect the top to be made of?

A. Steel.

Q. And how would you suspect it to be attached at the ground level?

A. Well, I would expect the pipe to come up about 2 or 2-1/2 feet above the ground and have a flange, a plate welded to it forming a flange, and then having a solid top with a gasket put over that, and the pipes of course would be welded to this solid top or they might even go through a nozzle with another flange on it so they could be removed easier.

Probably both pipes would go down one hole so you could pull the whole thing up, come to think of it. If you were designing one, I think that's what you would do. Instead of having two holes or two nozzles, you would have one big nozzle and have both pipes going down through, welded to a flange, and you could disconnect this flange and life it right out of there.

Q. So you would have a hole in the top of the steel plate which the pipes would go through?

A. You would have a flange on top of the well casing, and then you would have a plate over that which would be bolted down with a gasket to make it tight. And then in the middle of that plate or somewhere near the center, you would have a nozzle, maybe a four inch nozzle or a six inch nozzle coming up with a pipe flange on it, and then you would have a blind flange on top of that with two pipes going through it down into the well, a water line and an air line. That's what I would expect it to look like.

Q. What would the plate be attached to, below the plate?

A. The plate -- if you are talking about the mounting plate, it would be attached to a flange welded to the well casing.

Q. And a flange would be --

A. It could be square or it could be round. It probably would be round in this case because that was a pretty good sized pipe. I think it was a 12 inch pipe.

Q. And the flange would be how high? I mean, we are not talking about the Saint Louis Park facility. But the flange would be of a certain height?

A. Well, the flange would be of a certain thickness to take the gasket pressure. You would have to bolt it around and compress the gasket so it would

be tight and hold air pressure.

Q. Would the flange have a height dimension to it?

A. It probably would be an inch thick or maybe an inch and an eighth, inch and a quarter.

Q. What is below the flange?

A. Well, let's just say -- just to make it simple, let's just say you would take a slip-on twelve inch pipe flange. Now what that is you slip it on over the pipe and you weld it inside and weld it outside, and now you have a pipe with a flange on it. Then you would take a blind flange or a blank flange, twelve inch blank flange, and you put a six inch nozzle in the middle and another six inch flange and a six inch blank flange on that. Then you bolt the 12 inch blind flange to the 12 inch flange, and then you run your two pipes down through the blind flange. You weld it to that, and you stick them in the well and when it gets down as far as you want it, you bolt it down, and that's it, and it's tight.

Q. What provides a seal between this mounting mechanism you just described and the ground level?

A. The seal would be the casing, well casing itself.

Q. Does the well casing come above the ground

level?

A. If I remember correctly, that well casing came 2-1/2 to 3 feet above the ground level, yes.

Q. And a well casing, would you describe a well casing?

A. I think this well casing was a twelve inch pipe. I think it's a twelve inch pipe. It's twelve inch ID I believe, and about twelve and three quarter inch OD.

Q. "ID" being inside diameter and "OD" being outside diameter?

A. Right.

Q. If I am laying on the ground looking across the ground to the side of the well casing, what is up against the side of the well basing?

A. Up against the side of it?

Q. Yes.

A. Well, you have ground and you have this pipe coming out of the ground 2-1/2 to 3 feet, and then you have a flange around it.

Q. Okay. So we have the pipe coming up out of the ground?

A. Uh-huh.

Q. What's around the pipe, not above it? What's around the pipe?

A. You mean at the ground level?
Q. At the ground level.
A. Just earth.
Q. And then the mounting mechanism that you describe where the air and the water pipes or the water lines would go through would be at a point above the ground at the top of the casing?
A. Yes.
Q. Then the water line coming from the well would go into what we have talked about earlier as the stilling tank?
A. The stilling tank, yes.
Q. Do you have a present recollection of what that looked like?
A. Well, we read about it this morning. It said it was three feet.
Q. Go on. Do you have a present recollection of what it looks like? Can you recall seeing it apart from what the documents might say?
A. No. In fact, I guessed the dimensions and guessed wrong. I thought it was about twice as long. I don't remember it that well at all.
Q. Can you tell me whether -- as the water flowed from that to the cooling pond, can you tell me the mechanism through which the water went from that

pan to the cooling pond?

A. Well, I thought the pan was open at the end and the water just flowed out and into the pond. That's what I thought.

Q. Making this pan just a trough?

A. Yes, I thought the edge of it was right at the edge of the pond and the water just flowed out the end of it into the pond.

Q. So the water would flow into the pond from the pan just slightly above ground level?

A. I think so.

Q. Now, the cooling pond, can you tell me if the waters of the cooling pond were above or below ground?

A. I think the water in the cooling pond -- I think the surface of the cooling pond was I would guess about one foot below the ground level.

Q. Was there any sort of berm or banking or sides to the cooling pond?

A. If I remember, it was mostly gravel.

Q. Level gravel?

A. Well, sloped, you know, gentle slope.

Q. So are you saying that there was not any built-up sides to the --

A. Oh, no, no. There were no built-up sides. There was just a hole in the ground with water in it.

I don't even know whether it was natural or whether it was dug. I don't know.

Q. So there was nothing preventing surface flow from going into the cooling pond?

A. No, nothing.

Q. Now, if the cooling pond flooded then, it would flood the full perimeter of the cooling pond?

A. I have seen it not only flood the full perimeter of the cooling pond, I have seen it flood the floor of the refinery building, and I have seen it flood the road to the west of the refinery building.

Q. Being the height of water of approximately how many inches?

A. It was at least a foot over the refinery floor, a foot over the road, something like that. Twelve inches I would say.

Q. Twelve inches of water on the ground?

A. I would say so.

Q. When did you see that?

A. Sometime in the '50's. They had a flood when I was there.

Q. Now, is that the only occasion you actually saw the flooding?

A. Yes, I saw the flooding only one time.

Q. Now, with flood waters of that height, could

flood waters go up into the stilling pan?

A. Oh, they could back into the stilling pan, yes. I don't know if that would cause any problem or not but they could.

Q. Do you have any recollection of the height of the water line into the stilling pan above ground?

A. No, but I think it entered the top of the pan but I don't remember.

Q. Did you ever see waters flowing over the top of that pan?

A. No.

Q. Do you recall any discussions or consideration being given to doing something to protect the cooling pond from surface waters?

A. Well, we never did anything. No, we never took any action.

Q. Would it have been possible to dike the sides of that cooling pond?

A. I suppose it would have been possible.

Q. From an engineering viewpoint, what would be the various ways in which the cooling pond could have been diked?

A. You are talking now about just diking the pond to keep flood waters out of the pond?

Q. Sure, whether the flood waters are one inch

or twelve inches.

A. Well, I think you could have gone around the pan, I think. I think you could have gotten around in back of the pan, and there is a railroad track right adjacent to it which is bad. That's our main loading track for the refinery. See, that railroad track is right on the edge of the pond.

Q. Just to the east of the pond?

A. Just to the east of the pond. It's right on the edge. This would have posed a real problem because that track was right at ground level of course. I would say that would be the biggest obstacle to diking. Unfortunately that was our main loading track because everything that went out of that refinery had to use that track.

Q. So taking some action to prevent rain waters or surface waters from going into the cooling pond would have been engineeringly possible, and you would have had to make some accommodations for that track being present?

A. Yes, we would have had to do something about that.

Q. Throughout your tenure with the company, did you ever hear of tank cars spilling during unloading at the track in close proximity to the cooling pond?

A. No. I think most tank cars are -- most accidents like that occur when you are emptying the car rather than loading it, and most of the cars were emptied up at the tar cistern where it says "tar cistern", and there the pipe was connected to the bottom of the car and just run through a window in the tar cistern, and the tar just ran by gravity into the cistern. Now, we did get creosote oil shipped in by railroads, and it had to go to a pump and pumped to a tank; but I never heard of any being dumped. I never heard of any creosote oil car being dumped on the ground at Saint Louis Park.

Q. The tanks, the railcar tanks that carry creosote oil, were they pumped out on that track near the cooling pond?

A. I believe the creosote oil tanks are these tanks right here (indicating). I believe these are the oil storage tanks.

Q. All right. Where would you expect the tank cars to be --

A. I think they were pumped from right here. The pump was in this building. I am pretty sure they were connected. This would be here, I believe, and then the flow would be from a pipe to the pump and then from a pump to the tank.

Q. Where would the railroad car then be?

A. The railroad car would then be right here to the east of the tar cistern and to the -- call that west, I guess. Well, it would be north of the tar cistern and west of the tanker unloading shed. That's where I would say most of them were unloaded.

Q. So there was railroad tracks at that location as well?

A. Oh, yes. See this is close to the pump and also close to the tanks.

Q. Would an air lift pump operate if the well was not sealed?

A. That's a good question. I think it's possible; but I rather doubt it. I don't think it would be normal operation for anybody. I wouldn't say it can't be done though. I think it could be done.

Q. And the water would be removed from the well by what kind of means?

A. Strictly by the difference in gravity between the column of water containing minute air bubbles and the column of water containing no bubbles. That would be the only force you would have.

Q. Moved by kinetic energy?

A. Also by some kinetic energy of the air too, right.

Q. Earlier this morning -- I want to say it was Mr. Lauck, but if you recall discussion about the air lift system being an open system, and I think you said it was open because water was taken from the cooling pond.

A. Right.

Q. In addition to that reason, were there other instances in which the water system was an open one at that time?

A. Once it got into the fire pump -- well, I won't even say that. The only place it was open was that pond, and there were two lines that were open. There was the makeup water line from the well to the pond, discharging to the pond, that was open. And then the returning hot water from the still condensers to the pond was open because they went into the pond. Now, to my knowledge, that's the only open thing -- the only thing you have got that you can call open water supply in the plant.

Q. One of them was the makeup water from the well to the pond?

A. Makeup water from the well to the pond, and the other one was the hot water from the condensers to the pond.

Q. Would you describe the system for the makeup

water from the well to the pond?

A. Well, if you remember, both with the air lift and with the pumps later on, we pumped from the well to the pond with deep well pumps or an air lift, and this ran into the pond, and that's open. At the other end of the pond, we had a so-called fire pump which pumped water up into the still condensers, and then the hot water ran from the condensers back to the pond.

Q. In both of those instances you describe, it is the pond which is open to the environment?

A. Correct.

Q. So other than the fact that water in those systems is taken from the pond, which is open to the environment, you have no knowledge of other locations where the environment would have access to the water system?

A. That's right.

Q. And I take it that you say that that is right with your present recollection, and in that regard you have no recollection of exactly how the well looked during the time that it used an air lift pump?

A. No, I cannot picture the well other than when we put the first pump on it. Then I can picture it. But I cannot picture the well with the air lift in it, and I never saw the well with the oil lubricated

bearings. I never saw that pump.

Q. When you just said "first pump", you are speaking to the oil lubricated pump?

A. No, the water lubricated pump.

Q. I am sorry. I meant to say the water lubricated pump.

A. Right.

Q. And then this morning there was some discussion about the fact that the bearings on the water lubricated pump did seize from time to time?

A. That's right.

Q. Do you have an understanding as to why or how those bearings seized?

A. Well, according to the letters we read, why oil -- he called it tar. Tar and sand got in the bearings, and they seized. They just froze up. He had to clean them out, and then they would go again.

Q. So the tar and sand in combination solidified to the point where the bearings were not moving?

A. Well, it -- I don't know how it seized them but probably what happened is that they did not lubricate the way water would lubricate them, and the bearings probably got hot and expanded and seized. That's what happens. You get hot bearings even though it's pumping water. You know, you get a lot of

friction in there, and it will build up a lot of heat.

Q. And then the bearings the will stop moving?

A. Sure.

Q. And if you had that condition and then you removed the foreign material from the bearings, will the bearings operate again?

A. If they are not too badly damaged, you can use them again for a long time.

Q. Now, I understand with the water lubricated pump the bearings were exposed to the water in the well.

A. The water being pumped is what lubricated the bearings, right.

Q. With the oil lubricated pump, am I correct that the bearings were not exposed to the water?

A. No, they were sealed from the water. There are various ways of doing it. I don't know how they did it. There is no use going into that but there is a small quarter inch or eighth inch line. I think it's probably a quarter inch line going down into each bearing, and oil is piped down to the bearing.

Q. So it is true that with the oil lubricated pump, the bearings themselves are not exposed to the water in the well?

A. That is correct.

Q. If the well had some drippings from the oil

used to lubricate pumps and that was the only material that came into contact with the bearings on the water lubricated pump, then would those bearings seize because of contact with that sort of light oil?

A. You are talking now about the oil lubricated pump and if you lost a seal?

Q. No, I am not. That's not your fault. That's mine. I want to talk about the water lubricated pump, and as we just said those bearings are exposed to the water in the well.

A. Correct.

Q. And there has been earlier in different depositions some comment that perhaps the only material in the well by way of oils was light oils used in lubrication.

A. You don't mean though from the pump. You mean from air compressors or steam pumps or something like that?

Q. Exactly, from whatever equipment was lubricated, and that the materials that were in the well was that type of light oil used in lubrication. Okay? Now, my question is: if it was that type of light oil as used in lubrication that was in the well and if that type of light oil came in contact with bearings on the water lubricated pump, whether that

type of oil would be such as to cause bearings to seize?

A. I would say no because I would think the oil would be a better lubricant than the water.

Q. If you don't know say so. But do you know, as a standard practice at the Saint Louis Park facility, whether the water lubricated pump was run essentially continuously?

A. That I don't know. I know it was not run continually while the hydropneumatic tank was installed. That's why it was in there. How they ran it after the tank was installed, I don't know, after it was not used anymore.

Q. And earlier again today you were asked to explain from a maintenance point of view what differences there might be between a water lubricated pump and an oil lubricated pump, and as I heard your answer I understood the way those pumps operate in different fashions; but I will ask you instead if there was, from a purely maintenance point of view, whether there was any advantage of one pump over the other as far as you know?

A. From a purely maintenance point of view, I would think the water lubricated pump would be the better of the two for the simple reason that the guy didn't have to go around once a week or however often

they did it and lubricate the bearings. Every time the pump was running, it would be lubricated automatically.

Q. Okay. And as far as propensity to break down or useful life, that sort of thing, as far as you know there is no substantial difference?

A. Both pumps are used in wells extensively, and I don't think there is a whole lot of difference in the maintenance between one or the other.

Q. Still talking about this, still talking about this well, but jumping to 1977 or 1978, that occasion when you observed the well with Mr. Reiersgord, you mentioned that the well was open and --

A. I believe it was.

Q. And that there was a pipe coming up out of the ground about two feet high?

A. Something like that. This was the well casing you are talking about.

Q. So the well casing came up about two feet high?

A. Yes.

Q. How do I put this simply? Relative to the openness of the well, what was the access point by which the well was open to the environment?

A. Well, the whole top was open. It was a twelve inch pipe wide open.

Q. So it was a casing that was open?

A. The casing was open, yes.

Q. And then inside that casing, they were dropping their instruments?

A. They had a little instrument mounted on -- I can't remember whether it was a steel bar or what running across the pipe.

Q. Across the top of the casing?

A. Across the top of the casing, and I don't know how they were measuring. I don't know whether they dropped a float down there or whether they had a hand pump and pumped air and measured the pressure or what. All I remember was it was a gauge, and I asked the guy what it was for, and he said they are measuring the water level in the well. That's all I can remember.

Q. I have a better visual picture of what you saw now.

A. Good, because it's very vague to me.

Q. Just a few minutes ago I was asking you about engineering feasibility of diking with the cooling pond, and I am going to ask you the same question about the settling basin. Was it feasible from an engineering point of view to construct a mechanism to keep surface waters out of the settling basin?

A. Well, just from looking at your map, I would

say it would have been more feasible to do that than dike the pond; but I don't know whether everything is shown there or not but it looks like you have some room between the tracks and the settling basin whereas you had no room between the track and the pond. You know, I probably shouldn't do this but I notice that must be a natural pond because at one time the railroad went right over it. They built a bridge over it. I am sure they wouldn't dig a pond under a railroad track.

Q. Do you ever recall being involved in any discussions relative to diking the settling basin?

A. No.

Q. Back to the cooling pond, do you ever recall being in any discussions to simply trench so as to divert any surface water flows from entering the cooling pond?

A. Yes, there was quite a few discussions on that at one time.

Q. And the ultimate decision was not to do that?

A. I believe that's correct, yes.

Q. Did we talk about that before with the recommendation going to --

A. Mr. Reilly, yes.

Q. And looking at the cost and deciding against it?

A. Right.

Q. The one time when you saw the plant flooded, did the waters pick up coal tar, creosote, pitch, any of the products of the company that happened to be on the ground?

A. Well, I am sure it did because it would pick up anything like that if it flowed across the ground. However, I can't say this water over here was real dirty and this water was clean. I can't tell you where the oil slicks were or anything. You would expect it to. I am sure it did.

Q. The time that you were on the plant when it was flooding, what was it, just that the drainage from around the site was flowing onto the site?

A. When I saw it, it was flowing from the east side of the plant down the hill and across the refinery area toward the treating area. The flow was from east to west I would say.

Q. And the waters that entered the Reilly Tar property came from the property east of that?

A. Yes, it came from Louisiana Avenue is where it came from.

Q. Can you show me on Minnesota Exhibit 9 where Louisiana Avenue ran at that period of time?

A. It was to the east of the plant, I would say.

I don't remember. I don't know whether it came down here. It was over in this area. This sewer that was open was around in here somewhere. Maybe you can see it on here, I don't know.

Q. I see Louisiana Avenue.

A. Here is Louisiana Avenue. I think this must be before it was -- see, they put that through there. They were talking for ages about running it right through the refinery; but I think they moved it over and it came this way (indicating).

Q. Just for the record, you are looking at Reilly Tar Exhibit 3?

A. Uh-huh.

Q. In the 1950s when you saw the plant flooded, Louisiana Avenue did not run through the plant property, correct?

A. I don't remember that it did. Well, you mean -- I don't know when we sold that part -- see, we sold some ground to the city for Louisiana Avenue when they put it through, and just exactly when that was I don't know. I wouldn't even say -- you may be right. I wouldn't even say this flood was -- I don't know whether it was before or after Louisiana Avenue was changed. I don't know. I thought it was after but I could be wrong.

Q. Do you have a recollection of how far south Louisiana Avenue was built at the time you were on the property?

A. How far south?

Q. Yes.

A. I think it went all the way to Walker Street, didn't it? I believe.

Q. And was it continuous from the north to the south?

A. Well, they made it a big wide street. I don't know how many lanes it was. It had been a real narrow thing before.

Q. You earlier pointed, when locating Louisiana Avenue, to a spot on Exhibit 9 where the designation Wheeler Building is approximately. Do you see that?

A. Wheeler Garage, yes.

Q. Above that.

A. Wheeler Building, yes.

Q. Just above the writing where "Wheeler" is, Louisiana Avenue went that far?

A. I am sure it did. I think it did. I think it came clear down here.

Q. Can you trace the roadway of Louisiana Avenue from that point where we have "Road for Tanks" and "Wheeler Building" to Walker Street?

A. No, I can't.

Q. If you can't, you can't.

A. No, I can't.

Q. Okay.

A. I am not that familiar with the area, really. I haven't seen it for years.

Q. So what you observed was the waters flowing down the street of Louisiana Avenue and then onto the --

A. I wasn't out on Louisiana Avenue. I was out on our property, and I observed it coming down the bank on the east side of the plant and flowing across the refinery building and across the tank farm area toward the treating area.

Q. You didn't observe the water being discharged onto the property through a pipe or something like that?

A. I thought I did. I thought I had a recollection of that. The problem is over the years I have seen so many photographs of it and so many pictures, it's hard to say what I saw and what I saw a picture of. I have seen much worse floods than that in photographs. I am just telling you the one I saw. I thought I saw the water coming out of that pipe. You know, we are talking about something 25 or 30 years ago.

Q. But I would at least have to ask you what it is you think you may have saw, where was the pipe and

what was the pipe.

A. Well, I thought the pipe was up in the -- it just ended in an embankment up on the east side of the plant. It was just an open pipe, and the water was coming out of there and running down the side of the embankment and across the pond and across the refinery building and across that tank farm area, and the water -- I can remember the area where I was working was on the west side of the refinery building, and in the refinery building, and I can remember cars going through the road to the office. The water was clear up on the running board. Cars had running boards in those days. The water was clear up to there. I think if you would have opened the door, water would have run in. But they could still get through. I would say it was a foot deep, pretty close to it.

Q. Do you have any recollection of what this pipe was?

A. It was about an 18 inch concrete pipe.

Q. Do you know what purpose it served?

A. I thought it was storm water from Louisiana Street.

Q. The end of the pipe, was that on Reilly Tar property?

A. Yes, it was definitely on our property.

Q. Let's talk a minute about the settling basin. Would the settling basin remove phenols? If there were phenols in the water in the settling basin, would the settling basin remove them?

A. No, it would not.

Q. So even if the settling basin was operating at maximum efficiency, it was not designed nor intended to remove phenols from the waters that were in there, is that correct?

A. That is correct.

Q. The last time we were together you were shown this document, which is United States Deposition Exhibit 12, and I will just show you my copy, and you will notice that -- I think I am going to have very few questions on this. You will notice that certain chemical compounds were identified in this fellow's tests. You talked before about -- I can't pronounce them, but phenanthrene, pyrene and fluranthrene. Do you see those?

A. Oh, here you go. Phenanthrene, fluranthrene, pyrene?

Q. Right.

A. All right.

Q. And those compounds were detected in this fellow's tests?

A. That's what he says, yes.

Q. And his test was of emissions into the air?

A. Correct.

Q. My question is whether those chemical compounds were the result of the operation of the Reilly Tar facilities at Saint Louis Park?

A. Well, sure.

Q. Okay.

A. Uh-huh.

Q. And would those chemical compounds also be found in the discharge water from that same operation?

MS. COMSTOCK: If you know.

A. Well, I don't believe they would, no. I wouldn't say they wouldn't but I don't believe they would for the reason that we were making electrode pitch which is a residue, and the electrode pitch was poured into the pans, and what Mr. Gruenhagen was doing was measuring fumes from the pan to see how bad they were, to see if they were objectionable or not, and these fumes were coming off of a -- probably a hundred degrees C, which would be, you know, centigrade, not Fahrenheit, but they were coming off of 150 degrees C liquid pitch which was poured into the pan which solidified. The top of it solidified very rapidly. In fact, the vapors didn't last very long; but anyway,

these compounds are very high boiling compounds, and they are found in the residue, and I don't know how that would get into -- your question is how did it get into the water?

Q. My question is, would it?

A. I doubt it. My honest opinion is I sincerely doubt it.

Q. Back to the settling basin. If there were polynuclear aromatic hydrocarbons in the waters of the settling basin, would the settling basin separate those out?

A. Any polynuclear aromatic hydrocarbons that were contained in the heavy oils that would settle out would be settled out.

Q. How about those that were not contained in heavy oils?

A. Those that were very soluable in water such as phenols which would be about the only one I know about would go on through.

Q. How about chemical compounds known as heterocycles, would they be settled out through the settling basin?

A. I don't know what heterocycles are. I am sorry.

Q. Then you and I are about even. Would any

phenolic contamination of the water going out of the settling basin present any health hazard?

A. Well, I didn't think it did at the time.

Q. You had that understanding up through the time the plant closed?

A. Yes.

Q. And you had that understanding up through 1974?

A. Uh-huh. My understanding of the big objection to phenol was that when you chlorinated phenol, you got a terrible taste in the water that you couldn't get out. And most city water is chlorinated, and for that reason they didn't want phenols in because of the taste. That's what I had always heard.

Q. All right. Earlier you were shown State Exhibit 83, and I will again just show you my copy of it, and we looked at a couple of headings, K001 and K035. Do you recall that?

A. Yes.

Q. And you identified certain chemical compounds which you had knowledge would be in coal tar and creosote?

A. Uh-huh.

Q. And if my notes are correct, those were phenol chloramine-cresol, para-cresol, medi-cresol,

naphthalene, Benzole, anthracene?

A. Right.

Q. Would any of those chemical compounds be in the discharge water of the plant, if you have knowledge?

A. The only one I have knowledge of would be phenol because the rest would settle out; but phenol is very soluable in water, and it would not settle out.

Q. Before entering the settling basin, would any of those compounds be in the discharge waters at the Reilly Tar facility in Saint Louis Park?

A. Yes, they would.

Q. Would any of those that we mentioned not be in the discharge waters?

A. Well, there again, I am not a chemist; but any of the high boilers such as anthracene probably would not be in the discharge water for the simple reason that they would be left behind in the still with the pitch when you distilled off a creosote oil. We never made anthracene at Saint Louis Park. They require special equipment to take it out. Any of the high boilers, say -- well, what do you mean by a high boiler?

Q. Maybe I could put the question differently.

A. Okay, go ahead.

Q. Of the chemical compounds which you

understood were present in coal tar creosote, would you identify those which you understood would be in the discharge waters at the Saint Louis Park facility prior to going into the settling basin?

A. Well, it would be possible to have naphthalene. Of course we know phenols are in there.

Q. Chloramine?

A. I don't know. I don't know what that is.

Q. Creosote?

A. Well, creosote of course, yes. Creosote is a mixture of a whole bunch of oils. You know, it's not a chemical compound. It's a mixture of 1,000 chemical compounds you might say. There would definitely be creosote.

Q. Para-cresol?

A. Possible, I would say.

Q. Medi-cresol?

A. Possibly.

Q. Benzole?

A. I don't know.

Q. Anthracene?

A. Anthracene, I think you are getting too high a boiling now. I don't know how it would get into the settling basin; but if it did get into the settling basin, it would be a solid when it entered. That's for

sure.

Q. With regard to those compounds which possibly could get into the settling basin and prior to 1974, did you have any understanding whether they had presented a threat to health?

A. No, I have worked with them all my life, and, I know people that did, and nobody had any problems.

Q. Was it your understanding that they did not present a threat to health?

A. I never had any idea they presented a threat to health because as I say, I worked with them all my life, and I knew people that worked in the plant for years and years, and they were healthy when they retired.

Q. I guess right now between you and me, whether they do or don't really isn't what I am asking.

A. No, I realize that but you wanted to know if I thought --

Q. I just wanted to know what you thought.

A. I am just telling you from my experience, you know. I started out in college. I had a job hauling railroad ties on my shoulders for a contractor, and I had creosote oil smeared on me, and then I went to work for Reilly Tar & Chemical, and I had my hands in creosote oil and tar and materials like that for years.

I will admit that later on I was working in a clean office; but I had my share of getting covered with it, and I knew people that worked in the plant. Some of my good friends worked in the plant for years and years, and they retired healthy.

Q. All right. So is it correct that your understanding was that even if those compounds were in the discharge water of the Reilly Tar facility, that fact did not present a threat to health?

A. Not to me it didn't.

Q. And I take it it was further your understanding that those compounds did not present a threat to the drinking water supply of Saint Louis Park?

A. Well, I didn't realize they were getting into the drinking water supply of Saint Louis Park.

Q. It was your understanding that they were not getting into the drinking water supply, correct?

A. Correct.

Q. And I take it that if they ever did get into the drinking water supply, it would be your view -- speaking of a time before 1974, it would be your view that they did not present a threat to health?

A. If they did get into the drinking water?

Q. If they did.

A. Oh, no. Then I would say they would.

Q. They would present a threat to health?

A. Certainly.

Q. What is your understanding of the scope of that threat?

A. Well, I don't know anything about thresholds or things of that nature; but coal tar chemicals are not to be taken internally. I know that. In spite of the fact that phenol I know was used by dentists back in the '20's, and they were used in making mouthwashes and things of that nature. But I realize that you couldn't drink a substantial amount of this stuff, you know, of these chemicals. Now, whether a jigger full in a 10,000 gallon tank car would do anything to you, I don't know. That would be about one part per million, wouldn't it? A two ounce jigger in a 10,000 gallon tank car?

Q. Yes.

A. I have grave doubt that that would cause anybody any problem whatsoever.

Q. I have a general sense that if you take pure coal tar and put it in a glass and drink it, that would not be advisable.

A. You would be dead, yes.

Q. That would not be advisable?

A. No.

Q. But we are not really talking about that. We are talking about your understanding of what the consequences might be, if any, if there was contamination of the drinking water supply in Saint Louis Park with any of these compounds we have identified.

A. That's right.

Q. Which I take it is somewhat different from taking a glass of coal tar and drinking it.

A. Yes.

Q. And so my question is in the context of contamination of the drinking water supply of Saint Louis Park, did you have an understanding whether contamination of that water supply with any of the compounds you have just been talking about presented a threat to health?

A. Well, no, because when I was involved in the thing, what they were talking about was phenol, and we found other sources of phenol of course that could have gotten in. We don't know that it did get in. We weren't the only source of phenol in the area by a long shot.

Q. Is it correct that during the time of these discussions in the late '60's and early '70's it was phenol that was identified as the objectionable

contaminants?

A. Phenol is the one I heard the most about.

Q. Did you hear anything about any chemical compound other than phenol or oil?

A. Well, not for years. Not until all this Environmental Protection Agency type literature started coming out.

Q. I am talking about a period of time of the late '60's and early '70's. During that period of time, I take it that the discussion was limited to phenol and oil?

A. If you talked about contamination of water with coal tar oils, the thing that always came up was phenol. Always.

Q. Now, separating ourselves from those discussions and just asking about your knowledge as an engineer, with regard to the compounds that might get into the settling basin, did you have an understanding whether any of those compounds would present a threat to health if they were in the drinking water supply of Saint Louis Park?

A. I certainly wouldn't want them in the drinking water supply of Saint Louis Park. I would say yes.

Q. That you understood that in pre 1974?

A. That if they got in there, they would be a detriment to health I would think.

MS. COMSTOCK: Dick, it was your testimony earlier that you had no reason to believe, is that right, that they were in the drinking water supply? Is that what I heard you say before?

THE WITNESS: Well, that's right, yes. The only thing I heard about being in the drinking water supply was phenol, that's what I heard about, and we found sources of phenol. That were greater than what we were putting down there in the area.

BY MR. HINDERAKER:

Q. Do you recall ever having discussions along the lines that tests should be conducted in the '60's and early '70's to try to detect things other than phenol?

A. The first time I got into testing for various other chemicals was when the U.S. Army told us they wanted us to make tests for a permit.

Q. With regard to the drinking water supply of Saint Louis Park did you ever suggest that the ground waters be tested for things other than phenols?

A. Did I ever suggest it?

Q. Yes.

A. No, I did not.

Q. Do you recall or have you seen anything to lead you to believe that Reilly Tar suggested to the city or to the state that they test for compounds or elements in addition to phenols?

A. I can't remember that.

Q. Slightly different question, Mr. Hennessy. Do you have any knowledge, either back in the early '70's or now, as to the level of contamination of the compounds that we identified that might get into the settling basin necessary to cause a health threat?

MS. COMSTOCK: What time period is your question, Al?

BY MR. HINDERAKER:

Q. Then or now.

A. And your question is do I know how much of it would take to cause a health threat?

Q. Yes.

MS. COMSTOCK: What do you mean by "then", 1970?

BY MR. HINDERAKER:

Q. Yes, the time frame was prior to 1974. Did you have any knowledge as to the extent of contamination of those compounds necessary to present a health threat?

A. I had no knowledge at all of threshold values

of these chemicals. I would have no way of knowing.

Q. Is that true today as well?

A. Yes, if you asked me what the threshold value of phenol is, I don't know.

Q. Was it your belief in '72-'73 that if the plant closed, all pollution would stop?

A. Well, any pollution being caused by the plant would stop, of course. I mean you would be putting no water down. You would be putting no vapors in the air. Sure it would stop.

Q. Earlier we had looked at some exhibits relative to the permits with the United States Army, and some of those were dated in 1971, others in early 1972. My question is when is the earliest time you can recall being subject to government regulation from an environmental point of view?

A. At Saint Louis Park?

Q. At Saint Louis Park.

A. I think the Army was the first time I had ever been involved.

Q. Would that be true of the treating and the refining operations of Reilly Tar in general?

A. You mean all over the company or just at Saint Louis Park?

Q. No, the next question is all over the company.

A. Oh, no. We had to report to the state of Tennessee. That was the first one. I think they started about '46. Then we had to report to the state of Indiana, and report to the state of Ohio.

Q. Those were all early requirements?

A. I think the state of Indiana started their requirement about I would say 1948 or '49. State of Tennessee, probably '45 or '46.

Q. What were the parameters that were being measured?

A. Two parameters, phenol and oil.

Q. Is that true throughout all of the plants that were subject to any sort of government regulation?

A. The only reports that we made distinct were phenols and oil. That's what they required, and that's what we gave them.

Q. And the first involvement of the Federal Government was the U.S. Army?

A. Yes.

Q. I may have asked you this but it's only one question, is it true that the Saint Louis Park facility did not separate out phenols?

A. You can't separate phenols. They did not, no.

Q. Do you have any information to suggest that construction of storm sewers subsequent to the closing

of the plant in Saint Louis Park contributed in any way to the ground water contamination which is the subject matter of this lawsuit?

A. Well, we know that they discharged ground water from Louisiana Street, storm water down into our plant. We also know on occasions, this was generally speaking, the ground water from Louisiana Street. Now, the other -- there was at least one instance, in fact I believe there were two instances but one that I am sure of where they actually pumped water down the embankment on the north side of the plant, and that's when they did the most damage. That's when they flooded the cylinders. They flooded the boiler room and the cylinders and the building, and all that equipment which treats wood, wood treating equipment.

Q. That was an instance which was reported to you as opposed to observed personally?

A. That was reported, that's correct.

Q. Do you believe that any of those events contributed or caused contamination of the underground water or the drinking water supply of Saint Louis Park?

A. Well, they certainly didn't hurt it. What I mean is these waters, especially the water that flooded the treating cylinders, they would wash a lot of oil down over the yard. How far down that oil would

percolate into the ground, I couldn't say. I don't know. I am saying it would percolate further down being greatly diluted with water than it would if it were just plain old oil. I would think that would be worse than putting a puddle of oil on the ground.

Q. Do you have an opinion when water came over the north side of the property -- let's talk about one at a time. The time that it was reported to you when water came over the north side of the property, do you have an opinion whether any of the oils or products of the company that were picked up in that water, do you have an opinion whether any of those caused contamination of the drinking water supply of Saint Louis Park?

A. Well, I can't say that this water went here and went there and got into the drinking water this way. I can't give you a path of how it did it, no.

Q. Prior to the time the plant closed, did you believe that there was contamination of the city drinking water supply because of the operation of the Saint Louis Park facilities?

A. Did I have any knowledge of it?

Q. Yes.

A. No, I didn't. The only thing I had knowledge of were some letters where they said they found I think

something like one parts per million phenol in some wells they were pumping.

Q. Since that time and now have you come upon any additional facts to suggest that the drinking water supply of Saint Louis Park is contaminated because of any flood waters going across the property?

A. Well, there again I can't tell you what's meeting the ground water. I can't say the flood waters washed this oil down this crevass or down there, and it got into the drinking water and it was picked up in the well. I would have no way of knowing that.

Q. I am not trying to force things out of you. Is it correct that you do not have an opinion on that?

A. Well, no, I don't have an opinion on that particular question, no.

Q. As I understand from before, you do not consider yourself a hydrologist?

A. That is very true.

Q. And you do not consider yourself one with expertise in the permeation of surface waters to the underground waters?

A. No.

Q. So with regard to whether any flood waters going across the Saint Louis Park plant caused or contributed to any contamination of the city's drinking

water supply, is it fair to say that you do not have an opinion?

A. All right. I cannot say that the flood waters caused this contamination and here is why, because I don't know. That's true, I do not have an opinion.

Q. Now, I think it was around 1975 or so that there was some storm sewers put in around this area?

A. When was it?

Q. I think around 1975.

A. '75, that was long after my --

Q. Right.

A. Okay.

Q. Are you aware of any facts or do you have any opinion regarding whether the construction of those storm sewers caused or contributed in any way to the contamination of the city drinking water supply?

A. I don't even know anything about the sewers that were built in '75 so I would have no opinion.

Q. Subsequent to the time that the plant closed, there was some additional road construction across and around and in the vicinity of the site. Do you have any facts or do you hold any opinions to suggest that any of that road construction contributed in any way to the contamination of the city drinking water supply?

A. There again I can't say that this water got into the city wells, no. There is no way that I could say that.

MR. HINDERAKER: I took longer than I intended. I thank you for your patience.

MS. COMSTOCK: Off the record.

(At this time R.T.C. Deposition Exhibit 51 through 58 were marked for identification by the Court Reporter.)

DIRECT EXAMINATION

BY MS. COMSTOCK:

Q. Mr. Hennessy, I am going to ask you just a few questions this afternoon to help clarify some of the testimony that you have given in the past and provide the opportunity to introduce some additional documents as exhibits to your deposition. I want to clarify some of your testimony that you gave in response to questions asked by Mr. Hinderaker. I believe you testified when he was questioning you that Reilly Tar did not separate phenols at the Saint Louis Park plant.

A. That's right.

Q. Would your testimony change with respect to the phenol extraction tank at the Saint Louis Park

plant?

A. Well, I was talking -- I thought I was talking about the time from 1950 to 1970; but at one time, from about the late '30's to probably '49 or '50, there was a phenol extraction tank where phenol was extracted chemically.

Q. All right. And the intent of that then was to separate phenols from other waste water effluent?

A. Yes, right.

Q. I believe you also testified with respect to the effect of flood water coming across the property that was discharged from the eastern part of the Reilly property off of Louisiana was your testimony. I would like to ask you whether that flood water would have had an effect on the settling basin or other aspects of the Reilly treatment system at Saint Louis Park?

A. Well, it certainly did during the flood because the flood came from the north, actually washed through the treating cylinders where -- which had a concrete floor with a concrete gutter under each of the three cylinders, and any leaks of oil were caught in there and went into a sump where it was pumped to a tank. But when water entered the building and flooded it out and ran on through it, it just picked up any oil that was there and ran it on down and bypassed the

settling basin. And of course water coming from the east side would also run across the road and wash any surface oil or anything on the surface, bypass the settling basin and go on down the sewer.

Q. So it's your testimony then that the effect of that storm water would have been to cause certain effluents or waste from the plant to otherwise avoid the treatment system which would have been or through the settling basin --

MR. HINDERAKER: Objection to the question as leading.

A. Well, the flood would have -- the flood would have caused certainly an upset to the treating system, plus the fact that it would bypass -- a lot of it would have bypassed the treating system, and dirty water would have gone down the sewer under Walker Street.

Q. All right. Thank you. Mr. Hennessy, I believe quite a bit earlier in your testimony during this deposition, you indicated that you worked on various projects during World War II for Reilly Tar and Chemical?

A. That's right.

Q. Did you have a military deferment during World War II?

A. It was called an occupational deferment. I

think it was 2A or something like that. Up until about the late '40's I had that.

Q. Can you describe that occupational deferment? For whom was it given?

A. Well, the draft board decided whether you were so-called an essential person in an essential industry, and if you were, they gave you a 2A deferment which is what they gave me.

Q. Did you work on various government projects then during World War II while you were employed by Reilly Tar?

A. Yes, I did. We repiped the chemical plant to make carbazole and anthracene for the Navy. We worked on a -- now, we did that project. Now, I worked on other projects that didn't go. For instance, the Navy wanted a coal coking plant at Cincinnatti. I did some work on that; but they didn't build it. We worked on a landing mat for the -- well, it wasn't the Air Force. It was the Army then. What it was was we were going to stretch cables out on the ground, and we had wood sawed, and the men would take the cables. They would throw the wood overboard when the ship floated to shore and build these advanced landing strips for the planes in rough landing strips where they landed. But that didn't go because the aluminum company came up with a

better one. One of the aluminum companies made it out of aluminum, and that's what they used during the war.

A lot of defense plants had big wooden roofs, wooden trusses, and we also built bridges for the Ohio State Highway Department out of timber. There was a lot of timber construction used during the war because reinforcing bars and structural steel was not too available. You had to have a pretty high priority to get it, and if it wasn't necessary for the war effort or somebody decided it wasn't necessary for the war effort, they would give you a low priority. You had to play heck getting it. There was just none available.

Q. Did your occupational deferment then continue throughout World War II?

A. No, because I think they eliminated that in 1944, and then they gave me a 3A deferment which is a person with dependents.

Q. Were there other employees at Reilly that had occupational deferments during World War II?

A. Oh, yes.

Q. Can you give us a number that were deferred on that basis?

A. A number would be hard to say; but I would guess maybe 20.

Q. What percentage of the employment would that

have been at Reilly?

A. Well, I don't know whether it was a third of them. See this was a research laboratory and engineering. I would say anywhere from a third to a half of them.

Q. Okay. Thank you. Mr. Hennessy, I would like to show you what has been previously marked as State of Minnesota Exhibit 20 and 20A. Can you read those over and familiarize yourself with them?

A. All right.

Q. I believe in your testimony previously -- well, first of all, let me identify these documents. This is your memo to Mr. Finch dated September 30, 1970, marked as Minnesota Exhibit Number 20. And Minnesota Exhibit Number 20A is a diagram bearing the number in the bottom right-hand corner 701210-1, dated July 31, 1970. I believe in your previous testimony, you indicated that Minnesota Exhibit 20A bore the same numbers as referenced in Minnesota Exhibit 20, is that correct?

A. There are two drawings of the same number, yes.

Q. I believe you further indicated that -- well, these bear the same number. You had some concern that Minnesota Exhibit 20A referenced an API or described an

API separator, and your memorandum discussed an Eden separator?

A. Yes, if you read the letter, it sounds like the other document with the Number 701210-1 was the one that was attached to this letter.

Q. Mr. Hennessy, I would like to show you what's now been marked as Reilly Tar Exhibits 51 through 58, and in the set of exhibits is it correct that Reilly Tar Exhibit 53 bears a drawing Number 701210-1?

A. Yes.

Q. And that Reilly Tar Exhibit Number 54 bears the drawing Number 701210-2?

A. That's right, yes.

Q. Can you identify those drawings?

A. Well, these are obviously the drawings this letter is talking about because it says it's a flow diagram and a proposed -- layout and flow diagram. This is the layout (indicating).

Q. We are looking at Reilly Tar Exhibit 53?

A. Right, Reilly Tar Exhibit 53 and Reilly Tar Exhibit -- oh, here is the flow diagram, Reilly Tar separator or Reilly Tar Drawing 54 is the diagram, flow diagram and the layout.

Q. Can you describe the flow diagram, Reilly Tar Exhibit 54? What does it show?

A. Well, it shows the waste water going into the contaminated water sump which has two pumps, and then it shows it being pumped to the influent pipe of the Eden separator, and then it shows the effluent pipe coming out of the Eden separator going to the clean water sump with two pumps in it, and it shows it being pumped from there to the city sewer, and the oil -- this is the light oil that's taken off the top, goes to a settling tank, and here is the heavy oil coming off the bottom going to a settling tank, and then this is a transfer pump transferring light oil and heavy oil to Tanks 1 and 3 where it would be reused.

Q. Can you identify the date on Reilly Tar Exhibit 54?

A. The date, 9-24-70.

Q. Is it your opinion that this is likely the flow diagram referenced in Minnesota Exhibit Number 20?

A. I think it is because it says -- because that's what it says. It says, "Layout and Flow Diagram" and that's what these two are. This is the layout and flow diagram.

Q. Perhaps you can describe in a little bit more detail the layout in Reilly Tar Exhibit 53?

A. All right. It shows the new Eden separator is to be located to the east of the present retaining

basin, and these sewer lines -- new sewer lines are going to connect the office and the washroom to the contaminated -- oh, no, I am sorry. Office and washroom goes to the clean water sewer because it bypasses the settling basin. We don't want to separate out sanitary waste. The contaminated water goes from the new manhole through the new eight inch pipe to the contaminated pumps in the contaminated basin. Then from the clean water manhole, it's going to be pumped through a four inch city sewer to a manhole out on Walker Street.

Q. Can you identify the date on Reilly Tar Exhibit 53?

A. December 22nd, 1970.

Q. That date is later than the date of Minnesota Exhibit 20, which is September 30, 1970. Can you explain the difference in those dates?

A. Well, I don't remember exactly why; but I think what happened was we were in the process of design, and the drawing was prepared; but then when it was finished, that's when the man put the -- the draftsman put his initials and date on. I think this was attached to that letter which is dated what, September 30th in an incompleted state.

Q. An earlier drawing would have been submitted?

A. It may have been an earlier drawing and been redrawn. I don't remember. But it evidently wasn't at this state when it was attached to this letter.

Q. Can you perhaps explain a little bit further why the drawing numbers referenced in Minnesota Exhibit 20 are the same drawing numbers that identify your flow diagram of the Eden separator? I am sorry, Exhibit 20A which is the API separator. Why are the same drawing numbers assigned to two different drawings?

A. Well, I think that's a mistake that shouldn't have been. This is a small drawing, and it probably should have been underlined in the book. We made eight and a half by eleven drawings, and we made large drawings, and the small drawings were always underlined. Why he used the same drawing number twice, I don't know but he did. It looks like a mistake to me.

Q. All right. It's your opinion though that the layout and flow diagram drawings referenced in Minnesota Exhibit 20 are now what have been marked as Reilly Tar Exhibit 53 and 54?

A. Yes, because this is a layout, and the other one is a layout. This exhibit, which is marked 54 is a flow diagram, and this is a drawing of an API oil water separate for which the letter doesn't say that's what it is. It says we are sending them a layout and a flow

sheet. So I am pretty sure it was these two drawings that were attached to the letter.

Q. Okay. Mr. Hennessy, there are other drawings from the engineering department that have been marked as exhibits. Perhaps you can take a moment here and identify them begining with Reilly Tar Exhibit 51.

A. Well, these are details. What this is is a frame which goes over the sump pump so you can pull the pumps for maintenance. When you have a sump pump, you every once in a while have to pull it to maintain it. There are two pumps in there. You can pull one at a time. It's designed so that -- he has a trolley up here and he can put a chain hoist on and pull it up and work on it and put it back down. That's what this is. That is Exhibit 51?

MR. SHAKMAN: Mr. Hennessy, could I ask if there is an identifying number stamped on that? Give us that too.

THE WITNESS: 20199.

BY MS. CONSTOCK:

Q. Perhaps you can identify the drawing number.

A. 701210-6.

Q. And the date of preparation?

A. 10-21-70.

Q. All right.

A. Now this drawing there are two cone bottom settling tanks that we discussed earlier.

Q. This is Reilly Tar Exhibit 52?

A. This is Reilly Tar Exhibit 52, and the date is 10-21-70. The identifying number is 20198. The drawing number is 701210-7.

Q. Can you describe what this drawing entails?

A. These are two cone bottom tanks where the light oils and the heavy oils are going to be settled out. In other words, after the separator sets the oils out, we pump the oils into a cone bottom tank so we get real good separation. Then we separate the heavy oil and pump it to the storage tank, and when we get water we quit pumping. Then we use the tank again. The same way with the heavy oil tank. The heavy oil tank we do the same thing. We pump -- we separate out, take the off the top and pump the heavy oil to the tank.

Q. Reilly Tar Exhibit 53 and 54 you have identified.

A. Here is Reilly Tar Exhibit 55 which is drawn October 14, 1970 with identifying number 20202 and the drawing number is 701210-3. What this shows are the two sumps or two clean water pumps go in this sump and two contaminated water pumps go in this sump.

Q. Okay.

A. Now, this Eden separator. Now, I am looking at Document 56.

Q. Reilly Tar Exhibit 56?

A. Reilly Tar Exhibit 56. The date is 10-23-70, and the drawing number is 701210-4. Now, what this is is a pole barn or a building to go over the Eden separator. The Eden separator was going to be placed above ground on a concrete foundation, and it gets pretty cold up in Minneapolis so we figured we had better protect it with a building so it wouldn't freeze up on us. So that's the purpose of this building. It's just to protect it from freezing.

MR. SHAKMAN: What's the five digit number stand for?

THE WITNESS: That's Reilly's identifying number, 20201.

MR. SHAKMAN: I just wanted the digits.

BY MS. COMSTOCK:

Q. Mr. Hennessy, you are looking at Reilly Tar Exhibit 57?

A. Yes.

Q. And the date?

A. October 21, 1970. Drawing Number 701210-5 and the identifying number is 20200. What it is is the piping to the separator between the sumps and the

separator, how we were going to pipe it up.

Q. We are now looking at Reilly Tar Exhibit Number 58. This was drawn June 26, 1970. The drawing Number, 701207-1, and the identifying number is 20205.

Q. Can you describe that exhibit, Mr. Hennessy?

A. We had a tar vat marked here on the drawing as "Tar Cistern", and this tar cistern used to have a building over it, and the building got into a terrible state of disrepair, and we tore it down before it fell into the tar. This drawing was a drawing to put a new roof over the tar pit to keep rain water off the top of the tar.

Q. Mr. Hennessy, Reilly Tar Exhibits 51 through 58 bear the dates I believe June '70, through December '70, is that correct?

A. These.

Q. The engineering drawings?

A. Yes, right.

Q. During that period of time, were you chief engineer at Reilly Tar and Chemical?

A. Yes.

Q. Were those drawings prepared under your care and supervision?

A. Yes.

(At this time a discussion was held off the

record.)

BY MS. COMSTOCK:

Q. Mr. Hennessy, I am showing you a copy of Minnesota Exhibit 50 which is a memo from Carl Lesher to Mr. P. E. White dated May 14, 1968. I believe you received a copy of that memo according to the second page of the document?

A. Yes.

Q. On the second page, Mr. Lesher notes that an overall plan is needed for handling water and effluents from the Saint Louis Park plant.

A. Yes.

Q. The documents that we have just marked and you have identified as Reilly Tar Exhibits 51 through 58, were those drawings prepared in response to this memo from Mr. Lesher?

A. Well, I am sure they were. This was an ongoing concern.

Q. Mr. Hennessy, I would also like to show you what has previously been marked as U.S. Exhibit 25.

MR. HIRD: Off the record.

(At this time a discussion was held off the record.)

BY MS. COMSTOCK:

Q. This is a memo from T. J. Ryan to you, Mr.

Hennessy, dated October 7, 1970. In this memo Mr. Ryan seems to be expressing his concern that there has not been more rapid response to Mr. Lesher's request for an overall plan for a treatment system at the Saint Louis Park plant.

A. Yes, that's right.

(At this time R.T.C. Deposition Exhibit 59 was marked for identification by the Court Reporter.)

BY MS. COMSTOCK:

Q. Mr. Hennessy, I have handed you now a copy of a memo from R. J. Hennessy to T. J. Ryan dated October 8, 1970. Would you take a minute and look at that memorandum?

A. All right. I have read it.

Q. Was this memorandum prepared in response to the memorandum you received dated October 7, 1970 from Mr. T. J. Ryan?

A. Yes, it was.

Q. Can you describe what you were indicating to Mr. Ryan in this memorandum?

A. Yes. Mr. Ryan wanted to know why we hadn't made progress, and I am telling him we haven't made any progress because we can't move until we get permission to enter the city sewer and until the city approved our

plan and accepted our design and told us what we could do, why there was no point to building anything. We might end up building something we can't use, and this is a standard practice. You always get all the details ironed out with the people operating this sewage disposal plant, the sewer system before you go into it.

Q. What kind of permission were you seeking from the city of Saint Louis Park?

A. We were seeking permission to put our process water into their sewer. We wanted them to tell us what we had to do, what they would accept, and where we could go in and how we could go in and so forth.

Q. Were they attempting to regulate concentrations of any particular compounds or constituents from the Reilly Saint Louis Park plant?

MR. HINDERAKER: Objection, leading, lack of foundation.

THE WITNESS: Lack of foundational?

MR. HINDERAKER: I don't think you know what the city may or may not have been doing.

BY MS. COMSTOCK:

Q. You can answer the question.

MR. HINDERAKER: But you may answer the question.

A. Well, we asked the city what they would

accept, and they did tell us how much oil they would accept. I don't believe they ever told us how much phenol they would accept. We were still waiting for that. There was a definite qualified acceptance from the city for entering the sewer but it was qualified.

Q. Mr. Hennessy, if I understand you correctly, it was phenols and oils that you were waiting for the city to --

A. I believe they told us how much oil we could have in the water, and they did not tell us how much phenol they would accept.

Q. Did you ever get permission to connect to the city sewer?

A. Well, as I said, we got qualified permission. They said, "Yes, you can put so much oil in, and we don't know about the phenol. We will tell you later." I call that a qualified acceptance; but it wasn't actually a go-ahead, no.

Q. Do you recall when that conditional approval was received from the city of Saint Louis Park?

A. I think it was in late 1970.

Q. It would have been after your memorandum of October 8, 1970, Reilly Tar Exhibit 59?

A. I believe it was.

Q. Would it have been prior to the time that you

completed your engineering plan for the Eden separator?

A. It was around the same time. I don't know. Late in 1970.

Q. Would you have had to have waited for that approval to complete your plans of the Eden separator?

A. Well, as I remember, they told us what manhole we could go to. So we went ahead with the design, and we actually designed the sewer line. We got prices on the Eden separator. We did -- most of the design was done. It was almost 100 percent completed. We still did not have a definite yes that we could go in and we could put so much oil in and we could put so much phenol in. As I recall they told us how much oil we could put in; but they did not tell us how much phenol they would accept.

Q. It's your recollection that that conditional approval was obtained in the latter part of 1970?

A. Yes, if I remember correctly it was.

Q. How long had you waited to obtain that permission to connect to the city sewer system?

A. Well, Mr. Finch had been negotiating with them since 1969 or since Mr. Lesher's letter. That's when Mr. Finch started his meetings with them. About two years I would say, year and a half to two years.

Q. Mr. Lesher's memo of May 14, 1968?

A. Yes.

Q. Minnesota Exhibit 507

A. Right, that's what started this whole thing I believe.

Q. Would the implementation of the Eden separator treatment system have proceeded more quickly if the city of Saint Louis Park had granted you permission earlier?

MR. HINDERAKER: Objection, leading and also misleading.

THE WITNESS: Also misleading?

MR. HINDERAKER: It assumes that the City of Saint Louis Park had sole authority to grant you permission, and I don't think there is anything in the record to support that.

BY MS. COMSTOCK:

Q. The question, Mr. Hennessy, is whether the system and your final drawings would have been completed sooner if the city had given you the approval that you had finally obtained in the latter half of --

A. Yes, I am sure it would have because in the first place we didn't -- I remember there were all kinds of discussions about what manhole we would enter and how we would build the sewer and so forth. But it would have -- of course, it would have proceeded

earlier. The negotiations went on up in Saint Louis Park or Minneapolis for quite a while.

Q. Mr. Hennessy, you previously looked at Minnesota Exhibit 20A which is an API separator and also identified a flow diagram, Reilly Tar Exhibit 54, as an Eden separator. Is it correct that the Eden separator was the system you had finally concluded to utilize?

A. Yes.

Q. Why did you choose the Edens over the API?

A. Well, it was a piece of manufactured equipment, and you could get it a lot faster. These fellows could be building it in the factory while we were putting the foundations in, and then we could move it into the plant and set it on the foundations and pipe it up. It would have been a much faster installation.

Q. In addition to allowing more rapid installation did you have any opinion on the efficiency of the Edens over the API separator?

A. Well, my opinion was that at the time the Eden separator would be an improvement over the API separator. It was a pretty sophisticated piece of equipment for a settling basin.

Q. Mr. Hennessy, the flow diagram of the Eden

separator previously marked as Reilly Tar Exhibit 53, I believe you have identified that the plant effluent would go through the Eden separator and then ultimately would be discharged to the city sewer system, is that correct?

A. That's correct.

Q. Would there have been any merit or would there have been a requirement for any additional secondary treatment in your estimation of the plant effluent such as biooxidation ponds or so forth with this system?

A. The only time we ever were required to put biooxidation ponds in is if we went to surface water, if we discharged into a creek or a river. Now, in Cleveland, in Indianapolis, in Lima where we discharged into a city sewer, we never had a biooxidation pond, and none was required.

Q. Would the Eden separator have met the standards typically required of city sewer systems for for the plant effluents?

A. Well, if they would have told us what the final standards were; but actually I am sure it would have met it in Indianapolis. I am sure it would have met it in Cleveland. I am sure it would have met it in Lima, Ohio too.

Q. Mr. Hennessy, you have previously testified that you did not have any knowledge or understanding prior to 1974 that the waste water effluent at the Saint Louis Park plant created a risk to health or contained constituents that were carcinogenic. Has your opinion remained the same or is your understanding any different than it was prior to 1974?

A. Well, I don't think my opinion has changed a whole lot, no. I think what has happened is the regulatory agencies have gotten a lot more strict as the chemical tests for these various contaminants improved. In other words, when you could test for phenol, one part per million, that was their limit. Then when it got down to a tenth of a part per million, that was their limit. Then when it got down to a part per billion, that was their limit. This has nothing to do with the threshold of phenol in water. We have noticed that every time the chemists come up with an improved method of analyzing, why, the requirements get more strict. They must be going for zero discharge.

Q. Mr. Hennessy, just one final question. There have been a number of documents produced in this litigation regarding engineering records and so forth relating to the Saint Louis Park plant. Are there engineering records that are no longer available in

this litigation that were destroyed at one point in time?

A. Oh, yes. Yes, there are. About 1970 we built a new laboratory building, and we moved all the engineering documents into a room which was later used for a conference room, and we filled the whole room up with documents. So after a few years, may be 1974 or '75, I went to Doctor Sizlak and told him we needed more room and more file cabinets. His reply is, "You guys keep too much paper." Get rid of paper you don't need." So what I did was I went and emptied some drawers which contained records of creosoting plants which were no longer in existence, such as Lima, Ohio and Saint Louis Park, and I just emptied out a couple drawers so we would have some more room for the time being, and I am sure some Saint Louis Park documents were destroyed at that time, that is engineering documents.

Q. Is it likely that those file drawers contained documents that would not have included copies in offices other than at the Reilly lab?

A. Well, I understand that Herb Finch destroyed all his documents. He may have had a lot of records of them. The main office would have a lot of copies. In fact, we have seen them here. There are several places

where documents could have been repeated that are still available. One is the correspondence file which goes clear back to, I don't know, 1920 or so in the laboratory building. That was not -- as I understand, that was never destroyed; and the main office records, I don't think they were destroyed. I don't know but I don't think they were.

Q. Is it possible though, Mr. Hennessy, that the documents that you discarded to make more room at the new lab could not be located in other places today?

A. Oh, I am sure any engineering calculations or anything like that would have been lost.

MS. COMSTOCK: Thank you. I have no further questions of Mr. Hennessy.

MR. HIRD: I have some questions.

RECROSS-EXAMINATION

BY MR. HIRD:

Q. Mr. Hennessy, you had a phenol extraction tank that you described as being in operation at the plant between the late '30's and 1949, 1950. Was that extraction tank in effect before the oil water separator was installed in 1941?

A. I believe it was. I believe Mitchell put that in in about '38 or '39, somewhere around there.

Q. Why did Mr. Mitchell put that in in '38?

A. Why did he put it in?

Q. Yes.

A. I don't know. As I said, I was a young engineer just out of college. He didn't consult with me. All I knew is he put it in. I assume it was to clean up -- I am assuming again. But I believe it was to clean up the water cut from the refinery.

Q. Clean it up in what way?

A. Take the phenol out of it.

Q. Mr. Hennessy, you said that it was in operation or rather installed up to 1949 or 1950 but after 1950 it was no longer installed?

A. I think that is correct.

Q. Why was it taken out on?

A. I think the by-products plant where the thing was installed was raised. The building was -- the building was not piled. The architect who built it evidently didn't put adequate foundations under it, and the walls were cracked. It was getting in pretty dangerous shape, and they got out of the by-products operation, and all that equipment was taken out. The only thing left in there, as I remember, was an air compressor.

Q. So the phenol extraction tank was itself

extracted when Reilly got out of the by-products business?

A. Right.

Q. I couldn't resist that. Well, first of all, could you tell me whether in the effluent flow, the extraction tank preceded or followed the oil water separator?

A. Preceded.

Q. How would the extraction tank work?

A. Well, I don't know how that one worked but I think what happened is -- there are several ways of extracting phenol. I think the way that one worked is they hit it with a strong acid such as sulfuric acid, and then they hit it with caustic soda.

Q. And that would have the effect of doing what?

A. It would spring of phenol. The phenol would come out in a layer.

Q. On the top or on the bottom?

A. On top.

Q. So if I understand you correctly, the water containing phenol would come into the tank. It would be hit with caustic soda, and I forget what kind of acid you said.

A. I think they used sulfuric acid. I don't know.

Q. Sulfuric acid and caustic soda, and the effect would be to separate the phenol from the water and combine with the caustic acid -- I mean the caustic soda and the sulfuric acid would float on top?

A. Phenol is a weak acid so what they did is they -- I believe they hit it with caustic soda and they formed a sodium sulfa-phenol, the tar acids. Then they hit it with sulfuric acid which replaced the phenol, and they had three layers. They had a neutral oil layer on the bottom. I think they had a very thin layer of -- very thin layer of an emulsion between the two layers. Then they had the top layer which contained the phenol. Then they separated them in a cone bottom tank and recovered the phenol or neutral oil or whatever.

Q. When you say "they hit it" --

A. They put it in and mixed it up with it, yes.

Q. Now, I gather what you are saying there is a two step process. There is first a pre-tank where they are hitting it with a caustic soda and sulfuric acid. Then it goes to a second tank --

A. There again I don't know whether they used two tanks or one tank. They probably used two. I know a lot of these plants where they had this operation. They had lead-lined tanks for mixing in the sulfuric

acid. I am not familiar with the equipment they had at Saint Louis Park although I do know that they had a phenol extraction tank, and it was a cone bottom tank. I know that. What it was made of, I don't know.

Q. When the process was over, you testified there would be three layers. The phenol would be on top --

A. Well, you would have your -- yes, you would have -- I believe your phenol would be in the top layer.

Q. And then what would be the second layer?

A. That would be -- that would be an emulsion -- -- very thin emulsion layer, emulsion of oils and different kind of oils I guess.

Q. And water?

A. I think the water was gone by then.

Q. So this would be left out?

A. So what?

Q. Where would the water go? I guess that's what my source of confusion is.

A. I guess the water would go when he would chemically combine the caustic soda with the phenol or with any tar acids. You can't just do it with phenol. It would react with all the tar acids in the tank.

Q. So the water would go before settling?

A. Yes.

Q. So what would happen if the water would enter? It would be hit with the caustic soda and sulfuric acid, and the effect would be to immediately release the phenols and let the water run out?

A. I don't know how immediate it would be. This is essentially the way it worked. The way it worked is they grabbed onto the tar acids with caustic soda. They formed the sodium salt with the tar acids of which phenol is one then. They mixed in sulfuric acid, and what this did -- again, you can see I am not a chemist but what this did is this sprung the acids. This formed a sodium sulfate layer, and it formed a layer of -- emulsion, and then it formed a tar acid layer.

Q. But what I am trying to figure out is where the water went and how the phenols came out of the water.

A. The phenols were taken out of the water when the water reacted with the tar acids; but where the water went, I don't know. I don't know whether it was boiled off or whether it was settled off or what.

Q. Was the phenol extraction tank only used to extract phenols from the effluent from the by-products plant and not from other parts of the total Reilly facility?

A. Well, it was located in the by-products plant;

but I think the phenols came from the refinery. There again, I said before I didn't know whether it was just a water cut or whether it was a water cut and the first oil cut that went into this tank. I don't know. I am not that familiar with the operation of it.

Q. But other effluents would go to the settling basin without going through the phenol extraction tank?

A. Yes, that's right. Any other water from the refinery that was process water would go to the separating tank, the separator, without going through the phenol extraction tank. That's correct.

Q. So I believe you testified that the only water that was going to the phenol extraction tank would be water that came from the refining process in the by-products operation?

A. No, the refining products in the refinery operation, which is where the stills are, I believe that this tank was located in the by-products building but I believe the phenols that were extracted came from the tar refinery.

Q. But it was not the only effluent coming from the tar refinery?

A. No.

Q. Other effluent from the tar refinery would go straight to the settling basin without going through

the extraction tank?

A. Most of the effluent from the refinery was hot water from those condensers, and that went to the pond but -- what other water would he have? Well, he would have steam condensate or something like that probably.

Q. I am trying to get a clear picture of exactly what water went through this extraction tank. Is it the water that was produced as part of the refining process? Where would it come from in the refining process?

A. When you buy tar it has anywhere from 2 to 4 percent water in it. Okay?

Q. Okay.

A. When you distill the tar, the first thing that comes off is the so-called water cut which is mostly water but a little oil mixed in with it.

Q. So this would be the water cut?

A. That would be the water cut. Then the next cut would be your light oil cut, and I think there is phenol in that cut too. So these two cuts would then go to this extraction tank, I believe. I think that's the way it worked.

Q. And following 1950, the plant still manufactured and produced the wet cut and the light oil

cut?

A. That's right.

Q. BUt these cuts no longer went through the phenol extraction tank?

A. That's right.

Q. You mentioned before that the settling basin, which you designed in 1941, would have no effect in settling out phenols?

A. No, you can't settle out phenols. It doesn't settle.

Q. Would the Eden separator that you had considered installing in 1970 have settled out phenols?

A. No, it would not. Phenol is very soluable in water, and you can't settle it.

Q. I believe you testified in response to Ms. Comstock's questions that you had received a qualified -- I am sorry. Let me rephrase it. That you were delaying the installation of the Eden separator so you could get final approval from the city of Saint Louis Park?

A. That's right.

Q. But that you had a qualified --

A. That's as I remember it, yes.

Q. -- a qualified approval for the oil standard. In other words, you had qualified approval that the

separator would separate out the oil sufficiently?

A. Yes, that is correct.

Q. And I think you have testified that the Eden separator would not separate the phenols?

A. That's right.

Q. Yet you were still waiting before you would install the Eden separator to get approval from Saint Louis Park about a phenol standard?

A. That's correct. That's exactly what we did at all the other cities. We told them how much phenol there would be in the water, and they accepted it. Now, that's what we were trying to get Saint Louis Park or whoever ran the sewage system. I thought it was the city. I don't know who runs their sewer system. It might be the city of Minneapolis. I don't know. But, anyway the people running it wouldn't give us a figure and this bothered us because we didn't want to put this thing in and not be able to use it.

Q. But the installation of the Eden separator would have no --

A. That's right.

Q. So really that part of the City's approval was irrelevant to whether you would install the Eden separator or not?

A. It wasn't irrelevant if they said we were

going to put an amount down there greater than they would be willing to accept. You wouldn't be able to use it. Now, what we did in the other cities is we told them how much phenol there was in the water, and of course they knew because all of these cities, Cleveland, Lima and Indianapolis, we were reporting every month how much phenol was in our effluents going out of the plant. They all accepted it. They said it was going to be dilluted to so much. It wasn't going to be a problem. But in Saint Louis Park, huh-uh.

Q. What kind of equipment were you considering installing along with the Eden separator to take care of the phenol problem?

A. None. Just exactly what we installed at Cleveland and Indianapolis and Lima, none. You put it in there and the dillution takes care of it.

Q. So the only equipment you would have put in was strictly separation --

A. Strictly separation to get the oil out, that's correct.

Q. Mr. Hennessy, you testified that during World War II you had an occupational deferment?

A. Yes.

Q. Because of your work at Reilly Tar?

A. Yes.

Q. Did any of the work which justified your occupational deferment involve the Saint Louis Park plant?

A. No. Well, I am sure that that settling basin would not have been -- that's about the only thing I worked on before 1950.

Q. You mentioned --

A. And the reason it was built out of timber I am sure is because you couldn't get a priority for reenforcing steel in those days.

Q. But that was not one of the reasons why you were granted -- I am sorry, any work that you did at Reilly Tar that involved Saint Louis Park had nothing to do with why you got the occupational deferment?

A. I don't believe so, no.

Q. You mentioned that 20 other people in the Indianapolis lab --

A. That was a guess. You are talking 40 years ago now.

Q. You mentioned that roughly 20 other people?

A. Roughly, I will stick by that figure.

Q. In the Indianapolis lab were granted occupational deferments in connection with their work at Reilly. To your knowledge, did the work of any of those 20 people involve anything going on at Saint

Louis Park for which they were granted an occupational deferment?

A. Not to my knowledge, no.

Q. Do you know of anyone working at the Saint Louis Park plant who was granted an occupational deferment?

A. No, I didn't even know anyone at the Saint Louis Park plant at that time.

Q. Mr. Hennessy, you have shown us and have identified Reilly Tar Exhibit Numbers 51 through 58. Were any of the items shown in those diagrams, Reilly Tar Exhibits Numbers 51 through 58, ever constructed?

A. No.

Q. Mr. Hennessy, you testified that flooding had an effect on the efficacy of the settling basins to settle out oils at the Saint Louis Park plant. Was that true about the flooding that you saw when you were at the plant in the 1950s?

A. Well, I am sure it was, although I cannot -- I cannot tell you that I walked over and watched the settling basin not work because of the flood. I can't say that. But I am sure it was because it put a tremendous amount of water through it for one thing.

Q. When you saw the flood, when you were at the plant in the 1950s at the time of the flood, did any

Reilly employee mention any previous flood that had occurred at the plant?

A. Oh, yes.

Q. Were these flood of similar height, similar amount of water?

A. I think so.

Q. And you testified the flood that you saw in the 1950s was about a foot high?

A. I guessed it was about a foot over the road to the west of the refinery. That's how I remember it because I remember automobiles running through there, and the water was up over the running board.

Q. Did anyone talk about floods in earlier decades?

A. Before 1950?

Q. Yes.

A. Not to me they didn't, no.

Q. But there were earlier floods in the '50's?

A. I don't know. There may have been.

Q. That they discussed with you?

A. There may have been. I don't know.

Q. But you do recall them discussing earlier floods with you?

A. Floods earlier than the one I saw, yes.

Q. Of similar quuantities of water?

A. Yes.

Q. Mr. Hennessy, I would like you to refer to Minnesota Exhibit Number 3. Do you have a copy you can show him? You can turn your attention to the second page of Minnesota Exhibit Number 3, that is marked Page 5. First of all, to your recollection, Minnesota Exhibit Number 3 is an exhibit which Mr. Lesher has previously testified that he wrote sometime in 1963. I guess perhaps you might start at the bottom of Page 4 and just read over again that section.

A. All right.

Q. Is it your understanding that Mr. Lesher here is referring to problems in the operation of the settling basin?

A. Yes.

Q. At Saint Louis Park?

A. Yes.

Q. This is the same type of problems that Mr. Lesher was referring to in Minnesota Exhibit 50, his May 14, 1968 memorandum which you were just looking at, is that correct?

MS. COMSTOCK: I am going to object as calling for speculation on the witness's part of Mr. Lesher's thought process.

BY MR. HIRD:

Q. Is it your understanding that these are the same things Mr. Lesher is discussing both in Minnesota 3 and Minnesota 50?

A. Well, he is talking about the operation of the settling basin. He mentions it in both letters; but I don't know whether it's exactly the same problem or not but that's what he is talking about.

Q. Doesn't Mr. Lesher say in Minnesota Exhibit Number 3 that, "The area at and along the entire ditch along the plant including that past the entrance looks particularily black, is dirty and black with dirt and tar"?

A. We read that before.

Q. Doesn't he say in Minnesota 50 that at the time of his observation the visual appearance and quality of oil going out of the plant was terrible?

A. That's what he says.

Q. So between Minnesota 3 and Minnesota 50, was any action taken to improve the operation of the settling basin?

A. I don't know. As I said, I don't know much about the operation of the settling basin.

Q. But to your knowledge no action was taken?

A. I would have no way of knowing what action was taken.

Q. Was any consideration given to installing any new type of equipment in order to improve the settling basin or to replace the settling basin?

A. Between 1968 and 19 --

Q. Between '63 and '68?

A. I don't know when we first started talking about the Eden separator; but up until that time there wasn't any really serious discussion about it, no.

Q. Mr. Hennessy, I would like to show you now what Ms. Comstock has so graciously provided for us, the blue print which I would like have marked United States 30.

(At this time United States Deposition Exhibit Number 30 was marked for identification by the Court Reporter.)

BY MR. HIRD:

Q. Mr. Hennessy, do you recognize United States 30?

A. Yes, I do.

Q. Could you tell us what it is, please?

A. It's a settling basin that was built at Saint Louis Park in 1940.

Q. Is this the blueprint for the settling basin which you designed?

A. Yes, it is.

Q. Did you prepare this blueprint?

A. I guess I did. My initials are on it.

Q. I am afraid it's a little bit difficult to read United States Exhibit 30. Could you start with the upper left-hand corner and go down the left-hand of the page, and then start in the middle of the page and go down again and finally the right, and tell us what each of these diagrams represent?

A. See if I can remember what it was. Okay. This is a planned view or a top view.

Q. That's the first view in the upper left-hand corner?

A. Right, and it shows the overflow to the sewer.

Q. Why don't you just mark each view A, B, C, D, E, F, G, as you go along so it's easier for us to keep the record straight. Just put it in the corner. So View A is the planned view?

A. Planned view, top view, yes, right.

Q. Okay.

Q. View B?

A. View B is Section 8A and Section 8A --

Q. I am sorry. View B would be down here.

A. Yes, this is View B. Here is Section 8A. It's right through the center. So what this is, this is a section through the middle of it. In other words,

if you cut the basin this way, this is what you would see.

Q. Could you mark what we have been referring to as View B by D, and the area that you think is a correlation to it, could you mark with a D, please?

A. A "B".

Q. A "D". So View B and View D would show us exactly what part of the separator?

A. Well, it's a section through the center showing these -- 16 feet, let's see here now. What is this? Okay. I am wrong. This is Section 8A here. This is a view of the bottom. In other words, this is a top view looking down on it. This is looking down on a section cut right through here. Here is Section 8A, cut right through here. In other words, these are vertical timbers here. Okay? These are horizontal timbers across the bottom.

Q. So your testimony now is View A is the top and View B is the bottom?

A. B is the bottom.

Q. And View C is the side view?

A. View C is the side view, correct.

Q. Could you mark that with a C, please?

A. Side view.

Q. You might put "bottom" next to B?

A. Okay.

Q. Now, could you tell us what View D is? Have you changed your mind as to what View D is?

A. View D is the top view but not showing any detail. It just shows where the baffles are and where the overflow is.

Q. So View D relates to View A?

A. View D, yes, relates to -- I will put that down there, relates to View A.

Q. Okay. And moving along to View E, could you mark the next view with an E?

A. It's a section right through the middle, right there. This is a section through the center of the -- okay.

Q. Just put an E by it, if you would.

A. All right. Okay.

MR. LEININGER: Is that the length or the width?

THE WITNESS: Length, section through the length of it.

BY MR. HIRD:

Q. All these center sections are length-wise sections?

A. Yes, I don't see any sections the other way.

Q. Could you tell us, I think that's all one

view that followed, that's after View D, correct?

A. This is a detail of this connection to the sewer.

Q. So View F would be a detail of the connection to the sewer?

A. Yes, right.

Q. Of View E. And it would still be a through-the-middle view?

A. This is through the center of the spillway, yes.

Q. Could you put an F there, please, just so it's clear? Could you show us where the sewer would be on View F?

A. Well, let's see. He shows it going out this way which is on the side cut out there. Let's see where his --

Q. Which side of View F would be the sewer side?

A. Well, it looks like it's coming out this side here.

Q. So that would be the sewer side?

A. This is the sewer side.

Q. Could you mark that side "sewer side"?

A. Uh-huh.

Q. So it would be clear?

A. All right. Actually I am surprised the sewer

is that high. It may have been. This is -- this is varied some. Do you want me to mark this as sewer?

Q. Yes, just mark which side is the sewer side.

A. Okay.

Q. Just so we are clear. Okay. Continues on down. There is a very small diagram, View 2?

A. Details of how you fasten the -- let's see what this is. This is just details of how you fasten the baffles to the wall. That's all that is.

Q. Could you just mark that with a G and perhaps write "baffle detail"?

A. Yes, there you go, "construction of baffles".

Q. I see. Would that be true also of the next two? Could you just put "H" and "I" on each of those, and then just point out that they relate -- that H and I also relate to construction of baffles?

A. Right.

Q. Okay. I guess we go now to the right-hand corner. Is there something on the bottom of the page?

A. That just shows how the -- the contaminated water flows into this sump, and the sump pump pumps it out into this end of the basin, and the water goes down this way, and goes down the sewer here.

Q. So that's a side view of the process?

A. Right.

Q. Could you mark that side view with a "J", and could you write "sump" for where the sump is?

A. Yes.

Q. Just point an arrow. And point to the sewer connection. Could you just mark the sewer connection?

A. Well, there is a contaminated sewer going in here, and then the effluent goes out here. There is two sewer connections. I don't know exactly. Wait a minute. Here is -- this is this (indicating).

Q. That's a side view of the sump?

A. That's a side view of the sump where the sewer comes in.

Q. Could you mark that with I guess -- why don't you mark this with an N.

A. All right.

Q. N for the side view of the sump?

A. Uh-huh.

Q. You might just write "side view of the sump" under "N".

Q. I guess up here --

A. That would be K. That is your sewer going out here.

Q. Why don't you put a "K" there and mark it as "top view of the sump"?

A. Okay.

Q. And I think we have a little something over there. Could you put an "L" by it and would you tell me what it is?

A. This is a view of this alternate sump. I am sure the sump -- I won't say I am sure. We had two alternate sumps here. We could build this one or this one.

Q. So "M" or "N"?

A. I think M was built but I wouldn't swear to it. Do you want me to mark this "M"? This says "alternate sump".

Q. And "L" would be the top view of the alternative sump?

A. This angle here is this one, and this angle is this one, and this one is that one.

Q. So L is the bottom view, not the top view?

A. Yes, right.

Q. I am sorry, L is the bottom view of alternate sump N?

A. Right.

Q. Does that mean that K is actually the bottom --

A. Top view of this sump.

Q. K is the top view of sump M?

A. Yes, sump M.

Q. But is not --

A. See the bottom is just a big brown piece of concrete.

Q. So sump M is what was actually installed?

A. Yes.

Q. Could you mark -- and I guess use whichever of these many diagrams that is most convenient for you, but could you give us some indication on one of them of the position of the baffles?

A. The baffles are shown right here. That's a baffle there. Here is a baffle. Here is a baffle.

Q. You are circling the baffles on?

A. On E.

Q. On E?

A. Right.

Q. And these baffles were all -- these are all the baffles used to get rid of the --

A. Heavy oil.

Q. And not the light oil?

A. Right.

Q. Except for --

A. And that one gets rid of the light oil.

Q. Could you mark the light oil baffle? Just put "light oil baffle" on that.

A. All right.

Q. Okay. So the first one, the one that you

marked "light oil" on Section E is a baffle for light oils; and the remaining three, they are all heavy oil baffles?

A. That's correct.

Q. And on Exhibit E, water comes into the sump -- I am sorry, into the settling basin from which direction?

A. It's pumped in right here at this end. See, the pipe comes -- the contaminated water comes in and it goes over right here. This is where it is. This is the entry to the basin right here.

Q. Could you just mark it on E so we have it all on one? Could you mark "influent"?

A. Yes.

Q. And that actually comes all the way across from the left side of Exhibit E?

A. Yes, and the sump is here. There is the sump. It pumps it over here and the water comes back this way and goes out the sewer there.

Q. So if I understand you correctly, the water comes off the sump on the left side of the diagram, goes in a pump all the way over to the right side?

A. That is correct.

Q. Where it then flows into the settling basin and comes out again on the left side?

A. That's right.

Q. When it is discharged from the settling basin?

A. That's right.

Q. Could you just draw a dotted line with arrows just following the --

A. It's exactly like this one.

Q. You mean to here?

A. All the way through just to give us some sense of the flow, just a light dotted line so we see the water coming in.

Q. How is that?

A. And then follow it out again.

Q. Okay. Could you just draw arrows pointing away?

A. Uh-huh.

Q. Thank you.

A. Your welcome.

MR. HIRD: I have no more questions. Thank you, Mr. Hennessy.

MR. HINDERAKER: I think I have a very few.

RECROSS-EXAMINATION

BY MR. HINDERAKER:

Q. If I understand correctly, occasions when water was reported to you as having come from the north side of the property, as you are here today, that was a single occasion that you can recall?

A. I only know of one occasion when it came from the north.

Q. When was the technology available for API separators?

A. Well, I know it was available in the late '40's because we built one in the late '40's.

Q. And when was the technology available for an Eden separator?

A. I don't know but I don't think -- there again I don't think the company was all that old. I don't know how long they had been building them. I would be guessing if I said -- but I think it wasn't anything very old. All they did is they started manufacturing these things in a factory out of steel instead of building them in place out of concrete. They made it a manufactured piece of equipment, and they made some improvements in it.

Q. And the technology of the Eden separator was derived from the technology used in the API separator?

A. That's correct.

Q. And the technology of the API separator was

an improvement of the separator that's drawn on United States Exhibit 30?

A. Yes, it is.

Q. Do you have knowledge of the approval that the City of Saint Louis Park had to get relative to the discharge of phenol into the sewer system?

A. You fellows showed me a document that said that Saint Louis Park had granted approval for the oil and that document has -- I believe it says -- that same document says that they will tell us more about the phenol later or something like that.

Q. If I understand the situation, Reilly Tar & Chemical Company dealt with the city of Saint Louis Park with regard to the quality of water being discharged into the sewer, correct?

A. You had to. I don't know whether it was the city of Saint Louis Park, whoever ran the sewer district.

Q. No, no. As between Reilly Tar & Chemical Company, Reilly Tar & Chemical could you was dealing with the city of Saint Louis Park relative to the quality of the water to be discharged into the sewer, is that right?

A. Yes. I don't know who we dealt with because I didn't do the dealing. Herb Finch did, and who he

talked to I don't know.

Q. So as we are here now, you assume that Herb was talking to the city but he may have been talking to someone else?

A. He was talking to whoever was in charge of running the sewage system because these people -- we had to get permission from them to go into it, and they wanted to know what we were going to put into it, how much and what it was before they would let us go in.

Q. Am I correct that you do not know because you were not involved, but you do not know the various agencies that had input into the quality of the water that was to be discharged into the sewer?

A. I cannot remember with whom Herb Finch was talking, no. I don't know what government organization he was talking to; but he obviously was talking to whoever was in charge of the sanitary sewer system. Whoever that is I don't know.

Q. That's an assumption that you are making, right?

A. Well, it's a pretty good assumption, yes.

Q. Do you have a recollection of the number of years that the tar cistern was without a roof that kept water out of it, rain water out of it?

A. No, it was probably somewhere around five

years, four or five years I would say.

MR. HINDERAKER: Thank you.

RECROSS-EXAMINATION

BY MR. COYNE:

Q. Mr. Hennessy, you said that the API separator design was first used by Reilly Tar in the late '40's, is that correct?

A. That is correct.

Q. Where was that?

A. Indianapolis.

Q. That was the first time such a design was used?

A. I wouldn't say that. First time used by us. No, I am sure it wasn't the first time such a design was used.

Q. What other Reilly Tar facilities used that design?

A. Well, similar designs were used at Cleveland and at Chattanooga.

Q. When did the Cleveland design come into use?

A. Oh, I would say about the mid '50's, something like that.

Q. And the Chattanooga?

A. Probably about the mid '50's.

Q. Was the design as shown in the Reilly Tar exhibits that have been marked this afternoon different in concept than the designs for Indianapolis, Cleveland and Chattanooga that had been installed in the late '40's and mid '50's?

A. No, the concept was the same.

Q. I think you mentioned that there was secondary treatment methods used for discharges to surface water, is that right?

A. That is correct.

Q. And would such methods include biooxidation, activated sludge and air rated lagoons?

A. No, it included only biooxidation.

Q. And did Reilly Tar ever install such a system?

A. Yes.

Q. And when was the first time?

A. The first time, I can't remember whether it was Chattanooga or Lone Star. They are pretty close together. I would say -- let's say Chattanooga was first. Lone Star was second. Ironton, Utah was third. I think that's all we ever had. I can't think of anymore.

Q. And when were those installations put in?

A. I would say Chattanooga and Lone Star were put in in the early '60's, and Ironton was put in in

the late '70's, I believe.

Q. Why was it that a secondary treatment method was not installed in Saint Louis Park with surface water discharge in the early '60's when such methods were introduced at Lone Star and Chattanooga?

A. I don't know. It was never discussed and put in. In the first place, we did not discharge into a stream. I think that's the main reason.

Q. So your distinguishing between a surface water stream as opposed to surface waters found in a swamp or low living area as we have in Saint Louis Park?

A. That's right.

Q. And what is the basis for that distinction? That is, the one that the company did not use secondary treatment methods for the swamp it would for a stream.

A. I guess the basis for that distinction is whenever you went into a stream, you had to have -- you had to report on what you were putting in there. That is a lot of places you did, and you had to complete certain standards, and it required a biooxidation pond to do that.

Q. So that the company installed facilities pursuant to some requirement to do so?

A. Pardon? I didn't understand the question.

Q. The distinction you are making is that the

company would be required by some agency or another to install secondary treatment for a stream discharge but not necessarily for a discharge to a swamp?

A. Well, you have to abide by the rules, and if that's the rules you have to do it, yes.

Q. Did you earlier testify that you became aware of the Minnesota lawsuit against the company at about the time the plant closed in 1970 or 1971?

A. I think that's the first time I heard of it.

Q. Now, the destruction of the files, including those for Saint Louis Park, was done sometime in 1974 did you say?

A. That's my guess.

Q. So you were aware then at the time or had earlier been away that a lawsuit had been filed against the company?

A. I don't think I did. I didn't think these things would ever be used again. They were engineering calculations. They were just engineering records, and I was told to make room so I made room.

Q. Did you ever question the destruction of the Saint Louis Park files at the time they were destroyed?

A. Question them? Well, we were not in the habit of destroying any files, and that's what caused the disagreement at the lab. We were told we kept too

much paper, and we had to start getting rid of it, and I guess in a way it was true. I guess most people got rid of it after two years or four years or five years. We had letters dated back to 1920 in our files. So I couldn't argue with the guy. I guess he had a good reason for telling us that.

Q. Do you consider yourself an expert on health effects, Mr. Hennessy?

A. No.

MR. COYNE: I have no further questions.

MR. HIRD: Could I just ask one further question or two?

RECROSS-EXAMINATION

BY MR. HIRD:

Q. Mr. Hennessy, all of the destruction of files that you referred to were files that were destroyed deliberately by Reilly personnel and were not destroyed by natural causes or some other agency?

A. The only natural causes is we were told to get rid of some papers. We had to do it.

Q. But they were all destroyed deliberately by Reilly personnel?

A. Yes, I think I did it myself.

MS. COMSTOCK: I have only a couple of

quick clarifying questions.

REDIRECT EXAMINATION

BY MS. COMSTOCK:

Q. The Eden separator that was designed under your direction in 1970 was not constructed, is that correct?

A. That is correct.

Q. Why wasn't it constructed?

A. We didn't buy it because we weren't sure we could use it, and by the time we got the permission to go into the sewer, which as I said was a qualified permission, why we knew we were going to close the plant then. So naturally we weren't going to install something and then close the plant.

Q. Is it your understanding that Reilly had sufficient approval to complete final designs on the Eden separator and construct it?

A. If it were my money I was putting in, I would say no. I would never put my money in it.

Q. Can you explain your answer?

A. I mean, if you are in business and you are going to spend money to put some equipment in, it's got to serve a function. It's got to let you do something, like put your industrial waste into a city sewer and if

you build it for that purpose and then can't use it, you might as well just take your money and throw it away.

Q. Perhaps I am confusing myself here. There was not sufficient approval at any point --

A. Not to my knowledge, no.

Q. -- from the city to complete this project?

A. That is correct.

MR. HINDERAKER: I raise a similar objection to the question to the extent that he assigns responsibility without facts on the record.

THE WITNESS: What's the objection now? Repeat that, please.

MR. HINDERAKER: Your earlier testimony that you are not sure who Mr. Finch was dealing with.

THE WITNESS: What's that got to do with building a separator we can't use? I don't understand.

MS. COMSTOCK: I have no further questions.

THE WITNESS: This is law business I guess.

STATE OF MINNESOTA)
) ss.
COUNTY OF WASHINGTON)

Be it known that I took the deposition of RICHARD J. HENNESSY, on the 7th day of March 1983 at Indianapols, Indiana;

That I was then and there a Notary Public in and for the County of Washington, State of Minnesota, and that by virtue thereby I was duly authorized to administer an oath;

That the witness before testifying was by me first duly sworn to testify the whole truth and nothing but the truth relative to said cause;

That the testimony of said witness was recorded in Stenotype by myself and transcribed into typewriting under my direction; and that the deposition is a true record of the testimony given by the witness to the best of my ability;

That I am not related to any of the parties hereto nor interested in the outcome of the action;

That the reading and signing of the deposition by the witness was executed as evidenced by the preceding page;

That Notice of Filing was waived.

WITNESS MY HAND AND SEAL this 9th day of March 1983.

Kirby A. Kennedy

Court Reporter